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THE ATLAS OF THE CROSS SECTIONS OF MESIC ATOMIC PROCESSES

3. The processes $p\mu + (d,t)$, $d\mu + (p,t)$ and $t\mu + (p,d)$.

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ABSTRACT

The mesic atomic cross sections for elastic scattering ($a\mu + b \to a\mu + b$) and isotopic exchange processes ($a\mu + b \to b\mu + a$) in asymmetric collisions of $p\mu$, $d\mu$ and $t\mu$ atoms with bare p, d and t nuclei are presented. They have been calculated in the collision energy range $0.001 \leq E \leq 50eV$ using the multi-channel adiabatic representation for the Coulomb three-body problem. The results are in tables and figures.

1. Generalities.

The study of collisions between hydrogen isotopes (p, d, t) and their muonic counterparts has a twofold interest. While, on one side, they represent a classical problem of slow collisions for a system of three particles with masses of comparable weights, the other aspect which makes them worthy an accurate study, and which has given new impetus to the activity in the field, is their relevance for the analysis of muon catalyzed fusion. It is clear now that the stage starting from the formation of a mesic atom in its ground state and ending in the mesic molecule formation, where the above-mentioned collisions occur, demands precise theoretical and experimental investigations [1-3].

In our previous papers [4] and [5] we have presented the calculations of the mesic atomic cross sections for elastic scattering $(a\mu)_F + a \to (a\mu)_F + a$, $a = (p, d, t)$, and spin-flip processes $(a\mu)_F + a \to (a\mu)_{F'} + a$ (where F and F' are the spins of mesic atoms and $F \neq F'$) in symmetric collisions of $p\mu$,$d\mu$ and $t\mu$ atoms with the correspondent bare nuclei and molecules. Results for collisions with bare p,d and t nuclei and with H_2,D_2 and T_2 molecules were presented in refs. [4] and [5] respectively. Here we consider the asymmetric cases (the cases when the mass M_a of the colliding mesic atom $(a\mu)$ is different from the mass M_b of the target b nucleus) for elastic scattering $a\mu + b \to a\mu + b$ and isotopic exchange processes $a\mu + b \to b\mu + a$, which occur in a mixtures of hydrogen isotopes:

$$\begin{array}{ccc} p\mu + d & \rightarrow & p\mu + d \\ & \times & \\ d\mu + p & \rightarrow & d\mu + p, \end{array} \qquad (1a)$$

$$\begin{array}{ccc} p\mu + t & \rightarrow & p\mu + t \\ & \times & \\ t\mu + p & \rightarrow & t\mu + p, \end{array} \qquad (1b)$$

$$\begin{array}{ccc} d\mu + t & \rightarrow & d\mu + t \\ & \times & \\ t\mu + d & \rightarrow & t\mu + d, \end{array} \qquad (1c)$$

We consider the processes (1) for scattering of mesic atoms in their ground states only. Here we label the state $a\mu + b$ with a muon bound to a heavier nucleus $(M_a > M_b)$

as channel "1" and the state $b\mu+a$ as channel "2". The energy differences ΔE between the thresholds of the channels "1" and "2" (see Fig. 1) is equal to the isotopic shift of the ground state energy level of a mesic atom due to the replacement of nucleus a with nucleus b. The aim of the present paper is to calculate of the cross sections $\sigma_{ij}(E), i,j = 1,2$, in the range of collision energies E, which is of interest for describing the kinetics of muon catalysis processes.

For each reaction (1a)–(1c) there are two possible types of processes: the collisions with energy $E < \Delta E$ (below threshold) and the collisions with energy $E > \Delta E$ (above threshold) as shown in the following scheme:

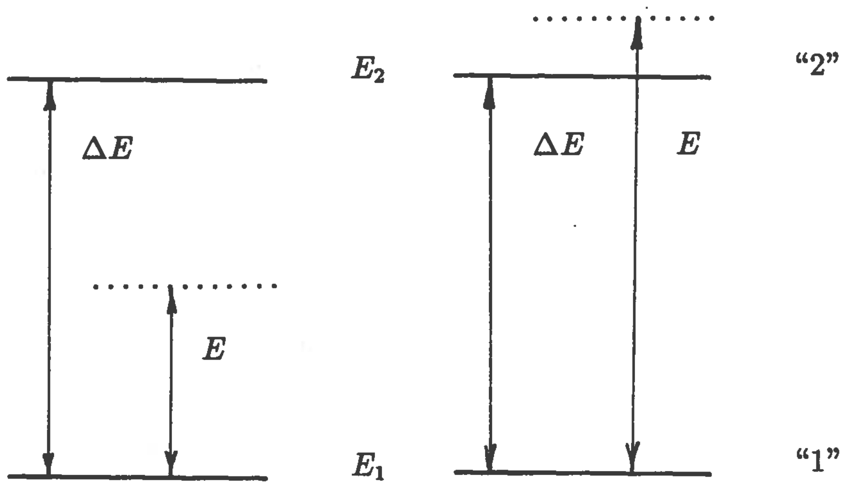

Fig. 1

In the case $E < \Delta E$ only the elastic scattering of the mesic atom $a\mu$ on nucleus b is possible. To calculate the cross section $\bar{\sigma}_{11}(E)$ of this process it is necessary to solve the multi-channel scattering problem with one open channel.

In the case $E > \Delta E$, in addition to the elastic collisions ($a\mu + b$,$b\mu + a$), also the inelastic processes ($a\mu + b \rightarrow b\mu + a$, $b\mu + a \rightarrow a\mu + b$) are possible. To calculate the cross sections σ_{ij}, $i,j = 1,2$, for these processes it is necessary to solve the multi-channel scattering problem with two open channels [3].

In our previous paper [4] the Coulomb and exchange interactions between nuclei, and hyperfine splitting of mesic atomic energy levels, due to the spin-spin interaction in mesic atoms, were taken into account. In the present calculations we only take into account the Coulomb interaction between the particles, since relativistic effects are negligible for the asymmetric cases, contrary to the symmetric case, where spin flip occurs due to muon exchange between the identical nuclei [4]. It is clear that the exchange interaction dominates the genuine relativistic effects by at least a factor of order $\alpha^{-2} = 137^2 = 2 \cdot 10^4$. This statement has been recently confirmed by a direct calculation [6].

To calculate the cross sections $\bar{\sigma}_{11}(E)$ and $\sigma_{ij}(E)$ we have used the multi-level adiabatic approach [7] in the form which is elaborated for the low-energy scattering problem as presented in our previous paper [4].

We report here some of the relevant equations, adapted to the peculiarities of the asymmetric cases.

As described in ref. [4] the cross sections σ^J_{ij} of the processes (1) are calculated by means of the formulas

$$\sigma^J_{ij} = \frac{\pi}{k_i^2}(2J+1)|\delta_{ij} - S^J_{ij}|^2, \tag{2}$$

$$\hat{S}^J = (1+i\hat{T})(1-i\hat{T})^{-1}, \quad \hat{T} = \begin{pmatrix} t_{11} & t_{12} \\ t_{21} & t_{22} \end{pmatrix}.$$

where the same notation of ref. [4] is employed. The elements t_{ij} of the $\hat{T}$ matrix are obtained from the comparison of the numerical solution of a system of N radial adiabatic equations (see Eqs. (5) in the Part 1 of the Atlas [4]) with the asymptotics of the multichannel scattering problem which in the case $E > \Delta E$ has the form of two linearly independent solutions:

$$\begin{pmatrix} \chi_1^{(1)} \\ \chi_2^{(1)} \end{pmatrix} \underset{R\to\infty}{\sim} \begin{pmatrix} \sin(k_1 R - \frac{\pi J}{2} + \delta_1) \\ -(v_1/v_2)^{1/2} t_{21} \cos\delta_1 \cos(k_2 R - \frac{\pi J}{2}) \end{pmatrix}, \tag{3a}$$

$$\begin{pmatrix} \chi_1^{(2)} \\ \chi_2^{(2)} \end{pmatrix} \underset{R\to\infty}{\sim} \begin{pmatrix} -(v_2/v_1)^{1/2} t_{12} \cos\delta_2 \cos(k_1 R - \frac{\pi J}{2}) \\ \sin(k_2 R - \frac{\pi J}{2} + \delta_2) \end{pmatrix}, \tag{3b}$$

where:

$$k_1^2 = 2M_{(N)}(\epsilon_2 + \Delta E_{(N)}), \quad v_1^2 = (\epsilon_2 + \Delta E_{(N)})/(2M_{(N)}),$$

$$k_2^2 = 2M_{(N)}\epsilon_2, \quad v_2^2 = \epsilon_2/(2M_{(N)}), \quad \epsilon_2 = E - \Delta E$$

$$t_{11} = \tan\delta_1, \quad t_{22} = \tan\delta_2, \quad t_{12} = t_{21}.$$

$M_{(N)}$ is the value of the effective mass, which depends on the number N of the states coupled to the open channels. For $N \to \infty$ $M_{(N)} \to M_{(b)} = M_a(M_b + m_\mu)/(M_a + M_b + m_\mu)$ and $\Delta E_{(N)} \to \Delta E$ (see [8,9]) .

For colliding energy $E < \Delta E$ the boundary conditions have the form:

$$\chi_1 \sim j_J(k_1 R) - \bar{t}_{11} n_J(k_1 R) \underset{R\to\infty}{\sim} const \cdot \sin(k_1 R - \frac{\pi J}{2} + \bar{\delta}_1) \tag{4}$$

where

$$k_1^2 = 2\epsilon_1 M_{(N)}, \qquad M_{(N)} \to M_{(a)} = (M_a + m_\mu)M_b/(M_a + M_b + m_\mu)$$

and $\epsilon_1 = E$.

In this case the elastic scattering cross sections are:

$$\bar{\sigma}_{11}^J = \frac{4\pi}{k_1^2}(2J+1)\frac{\bar{t}_{11}^2}{1+\bar{t}_{11}^2}. \tag{5}$$

It is also possible to calculate the differential cross sections $d\sigma_{ij}/d\Omega$ of the processes (1) using the obtained T-matrix (S-matrix):

$$\frac{d\sigma_{ij}}{d\Omega} = \frac{1}{4k_i^2}|\sum_J (2J+1)(\delta_{ij} - S_{ij}^J)P_J(cos\theta)|^2. \tag{6}$$

where $P_J(x)$ are the Legendre polynomials.

2. Calculations.

Most of the previous calculations of cross sections were made in the two-level approximation, i.e. with $N = 2$ in the system of adiabatic equations [10]. The development of the method proposed in ref. [11] made it possible to improve significantly the results of the two-level approximation. Using this effective mass approximation (so called "simple approach") M. Bubak and M.P. Faifman have calculated the cross sections for all the processes of mesic atom–nucleus scattering at collision energies $E \leq 100$eV [12]. Another method to improve the two-level adiabatic approximation has been considered by J. Cohen and coworkers in ref. [13], and the results of the calculations were recently presented for both symmetric and asymmetric mesic atomic collisions in ref. [14]. A variational approach has been used by M. Kamimura to estimate the isotopic exchange rate $d\mu \to t\mu$ [15], where a handred of trial functions was used.

The calculation of the effective potentials of the three-body problem [16,17] connecting the states of both the discrete and the continuous spectrum of the two-centre problem [18] and the development of the algorithms for solving of the multi-channel scattering problem with a great number of closed channels [9,19,20] made it possible to obtain the mesic atomic cross sections by the use of the multi-level adiabatic approximations. The first calculations carried out within this approach for elastic and inelastic cross sections were presented in refs. [9] and [21]. Then it has been succesfully used in calculations of all the cross sections of mesic atomic collisions with identical nuclei [4], where the accuracy of the calculations due to truncation of the adiabatic expansion and numerical errors has been estimated [22].

To calculate the mesic atomic cross sections for asymmetric collisions (1), we have used the same effective potentials of the three-body problem [16,17] as for the symmetric case [4]. We have taken into account the effective potentials connecting all the states of the first 3 shells ($n = 1, 2, 3$ in separated atom classification [7,18]) of the discrete spectrum of the two-centre problem and the states $n = 1$ of the discrete spectrum with the states of the continuous spectrum. In calculations the first 3 shells of the continuous spectrum with $l = 0(1)5$ and $m = 0$ are used for $J = 0$ (the number of equations $N = 276$), the first 6 shells: $|l = 0(1)5, m = 0\rangle$, $|l = 1(1)6, m = 1\rangle$, for $J = 1$ ($N = 546$) and the first 2 shells: $|l = 0, 1, m = 0\rangle$, $|l = 1, 2, m = 0\rangle$, for $J \geq 2$ ($N = 196$). We have made the following discretization of the momentum k labeling the states of the continuous spectrum of the two-centre problem: k_i : 0.1(0.1)3.0(0.5)10 in mesic units (44 points for every (lm) state).

The system of equations was integrated in the interval $0 \leq R \leq R_m$ with the step of integration $R = 0(0.1)20(1)R_m$ and boundary conditions (3,4) at $R = R_m$. Depending on the energy, it varied from a minimum of $R_m = 60$ to a maximum of $R_m = 80$ in mesic units [20].

To solve the multi-channel scattering problem, for the processes (1) we have improved an alghorithm that will be described elsewhere [20]. The convergence of the adiabatic expansion for these processes and also the convergence with respect to the length of the integration step and to the range of integration has been analyzed. It has been estimated that the errors for the cross sections $\sigma_{ij}(E)$ are less than 10%.

3. Results and Discussion.

The results of the calculations are presented in Tables 1-30 and Figures 1-30. Every table is followed by the figure where the data reported in the table are plotted.

In Tables 1-15 the T matrix elements are presented as a function of the colliding energies ϵ_i and the channel momenta k_i . The energy dependence of the T-matrix is shown in the correspondent figures. These information can be used for the calculation of differential and total scattering cross sections by formulas (2), (5) and (6). In Tables 16-30 the partial cross sections $\sigma^J_{ij}(E)$ and the total cross sections $\sigma_{ij}(E)$ are presented. The energy dependence of the cross sections is shown in figs. 16-30. On the figures 16, 20.a, 21, 25.a, 26, 30.a the energy is reckoned from the threshold E_1 and on others from the threshold E_2.

The obtained results are the most complete in the field, to our knowledge. Moreover, a careful analysis of the convergence of the adiabatic expansion has been carried out. As a whole, they agree with our previous multi-level calculations [9,21], where the main part of the matrix of the effective potentials used in the present calculations has been taken into account. The agreement of our results with the previous improved two-level calculations [12,14] is not so good as for the symmetric cases. We should mention, however, that to reproduce our results for reactions (1.a) and (1.b) with $10-15\%$ accuracy it is enough to solve the system of adiabatic equations with $N=2$, with the effective mass M included, and to correct ΔE, as suggested in ref. [12]. On the contrary, this is not true for the (1.c) reaction; in this case the "simple approach" fails to give good results (see Table A). The results of another improved two-level approach recently presented [14] are rather different from our results for the inelastic cross sections $\sigma_{21}(E)$, by an amount of $20-50\%$. For the elastic cross sections the agreement of that approach with our results is satisfactory (beyond resonance energy regions, where our treatment is more carefull). In order to assess the results of the different approaches pursued in this investigation, in Table A we compare the rates for the isotopic exchange $d\mu \rightarrow t\mu$ (reaction (1.c)), $\lambda = \sigma_{21} V N_0$ (where $N_0 = 4.25 \cdot 10^{22} cm^{-3}$), obtained by several authors. Note that this is the case of maximal deviation of our results from those obtained within the improved two-level approximations [12,14]. It should also be noticed the good agreement of our results with the previous multi-level adiabatic calculations [21] (where the less number of effective potentials for the system of the adiabatic equations was used), with the variational calculation [15] and with the experimental data [23-25]. Here we have not considered the effects of the electron screening and molecular structure on the process. They do increase the rate at low energies ($\epsilon_2 \leq 0.1 eV$), but by an amount not exceeding 10% (see refs. [26,14] and ref. [5]).

In the cases, where the discrepancies are more relevant, we estimate the present results to be the most reliable of all the calculations known to us.

We should also mention that we have reproduced all the shape resonances found in the two-level adiabatic calculations [12,27], without finding any additional resonance. Of course the present multi-level calculations give slightly different values for the resonance parameters. They can be extracted from tables 16-30, where the cross sections are presented.

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Table 1: T-matrix, $d\mu + p$.

ε_1(eV)	k_1	$J=0$	$J=1$	$J=2$	$J=3$
0.001	0.1546E-02	0.2477E-02			
0.002	0.2186E-02	0.3389E-02			
0.003	0.2678E-02	0.4115E-02			
0.004	0.3092E-02	0.4704E-02			
0.005	0.3457E-02	0.5213E-02			
0.006	0.3787E-02	0.5686E-02			
0.007	0.4090E-02	0.6063E-02			
0.008	0.4373E-02	0.6573E-02			
0.009	0.4638E-02	0.6962E-02			
0.010	0.4889E-02	0.7190E-02	0.1359E-03		
0.020	0.6914E-02	0.9713E-02	0.2700E-03		
0.030	0.8468E-02	0.1143E-01	0.3980E-03		
0.040	0.9778E-02	0.1316E-01	0.5275E-03		
0.050	0.1093E-01	0.1391E-01	0.6526E-03		
0.060	0.1198E-01	0.1523E-01	0.7788E-03		
0.070	0.1294E-01	0.1596E-01	0.9027E-03		
0.080	0.1383E-01	0.1663E-01	0.1024E-02		
0.090	0.1467E-01	0.1727E-01	0.1145E-02		
0.100	0.1546E-01	0.1793E-01	0.1264E-02	0.2003E-03	
0.120	0.1694E-01	0.1888E-01	0.1501E-02	0.2401E-03	
0.140	0.1829E-01	0.1959E-01	0.1726E-02	0.2800E-03	
0.160	0.1956E-01	0.2023E-01	0.1963E-02	0.3202E-03	
0.180	0.2074E-01	0.2080E-01	0.2184E-02	0.3602E-03	
0.200	0.2186E-01	0.2122E-01	0.2406E-02	0.4005E-03	
0.300	0.2678E-01	0.2238E-01	0.3446E-02	0.6021E-03	
0.400	0.3092E-01	0.2241E-01	0.4403E-02	0.8016E-03	
0.500	0.3457E-01	0.2189E-01	0.5272E-02	0.1011E-02	
0.600	0.3787E-01	0.2090E-01	0.6102E-02	0.1219E-02	
0.700	0.4090E-01	0.1956E-01	0.6835E-02	0.1420E-02	
0.800	0.4373E-01	0.1810E-01	0.7570E-02	0.1630E-02	
0.900	0.4638E-01	0.1647E-01	0.8134E-02	0.1824E-02	
1.000	0.4889E-01	0.1468E-01	0.8843E-02	0.2038E-02	0.6663E-03
1.200	0.5356E-01	0.1088E-01	0.9886E-02	0.2469E-02	0.8016E-03
1.400	0.5785E-01	0.6830E-02	0.1073E-01	0.2904E-02	0.9319E-03
1.600	0.6184E-01	0.2614E-02	0.1155E-01	0.3324E-02	0.1062E-02
1.800	0.6559E-01	-0.1714E-02	0.1223E-01	0.3783E-02	0.1203E-02
2.000	0.6914E-01	-0.6118E-02	0.1281E-01	0.4211E-02	0.1331E-02
3.000	0.8468E-01	-0.2862E-01	0.1428E-01	0.6573E-02	0.2013E-02
4.000	0.9778E-01	-0.5098E-01	0.1385E-01	0.9125E-02	0.2658E-02
5.000	0.1093E+00	-0.7270E-01	0.1190E-01	0.1192E-01	0.3352E-02

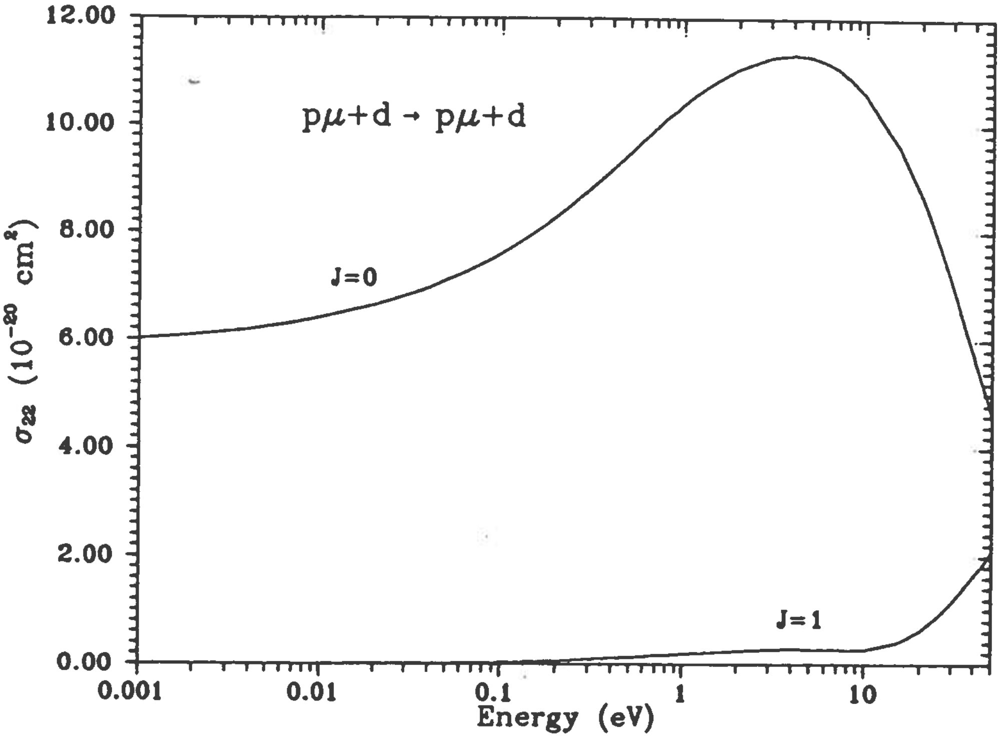


Fig. 19

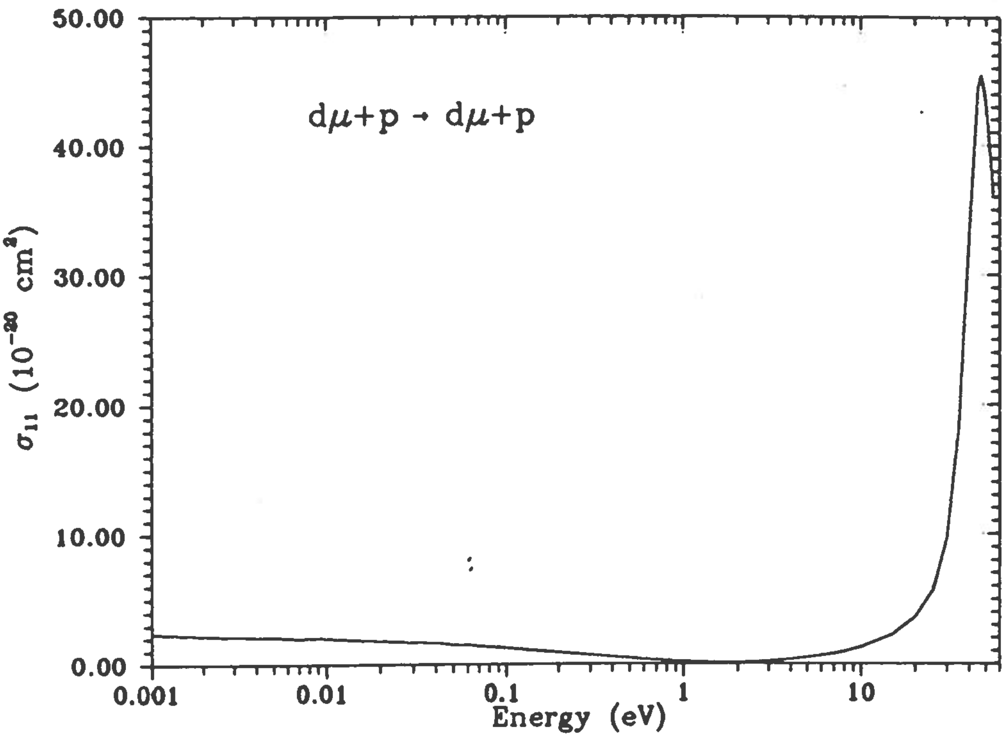


Fig. 20.a

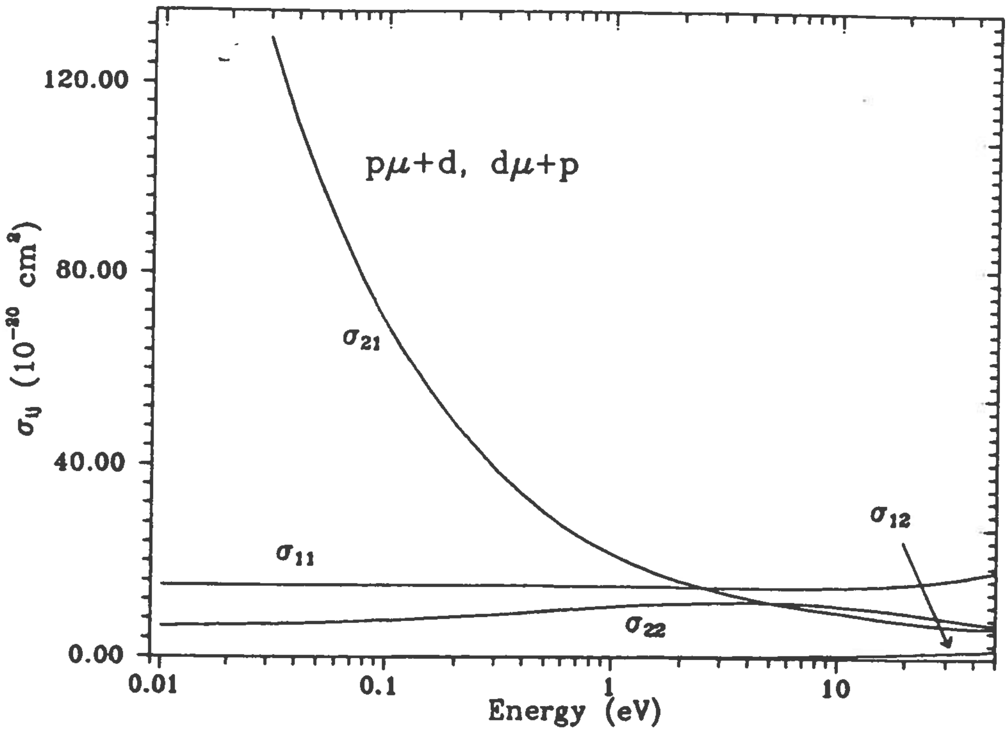


Fig. 20.b

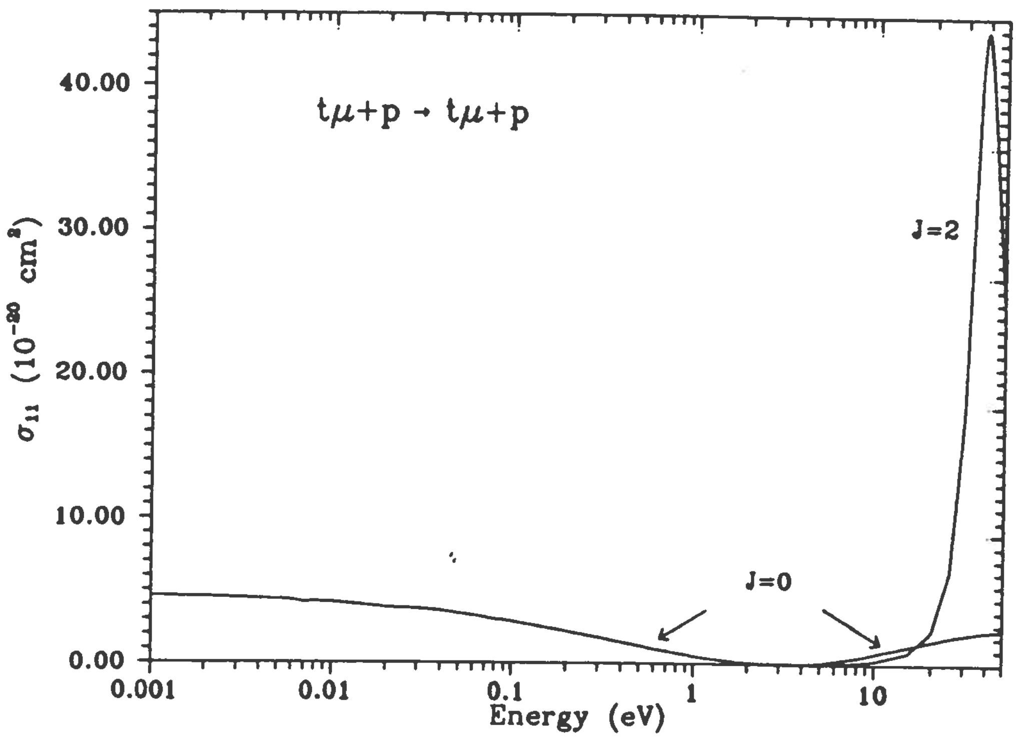


Fig. 21

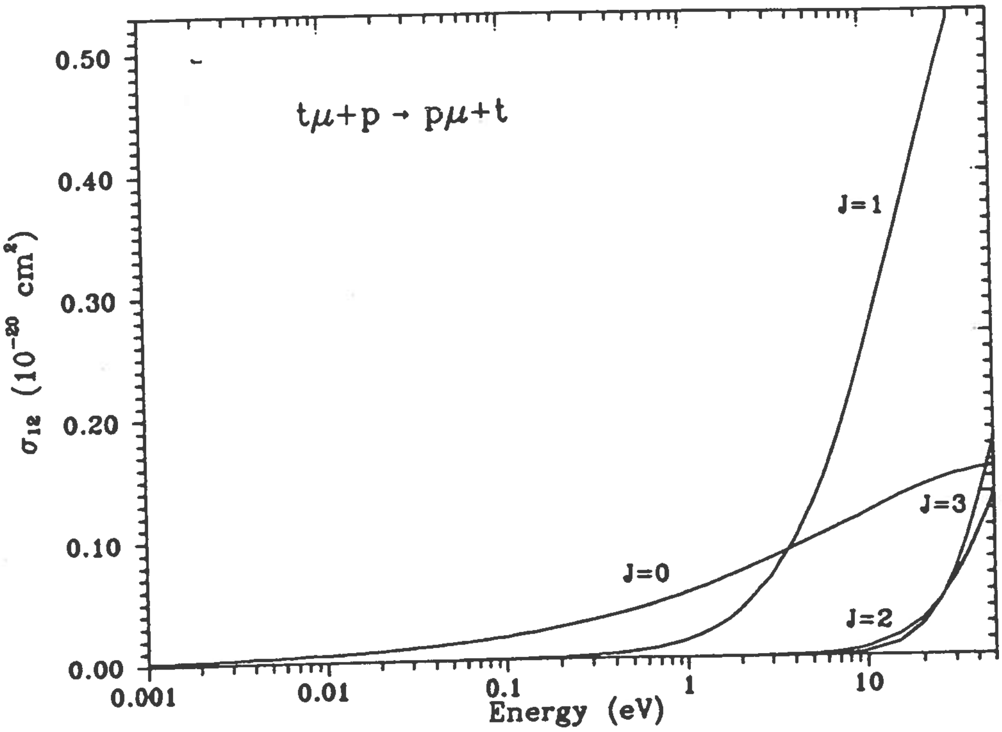

tμ+p → pμ+t
J=1
J=0
J=3
J=2
σ_{12} (10^{-20} cm^2)
0.50
0.40
0.30
0.20
0.10
0.00
0.001
0.01
0.1
1
10
Energy (eV)

Fig. 22

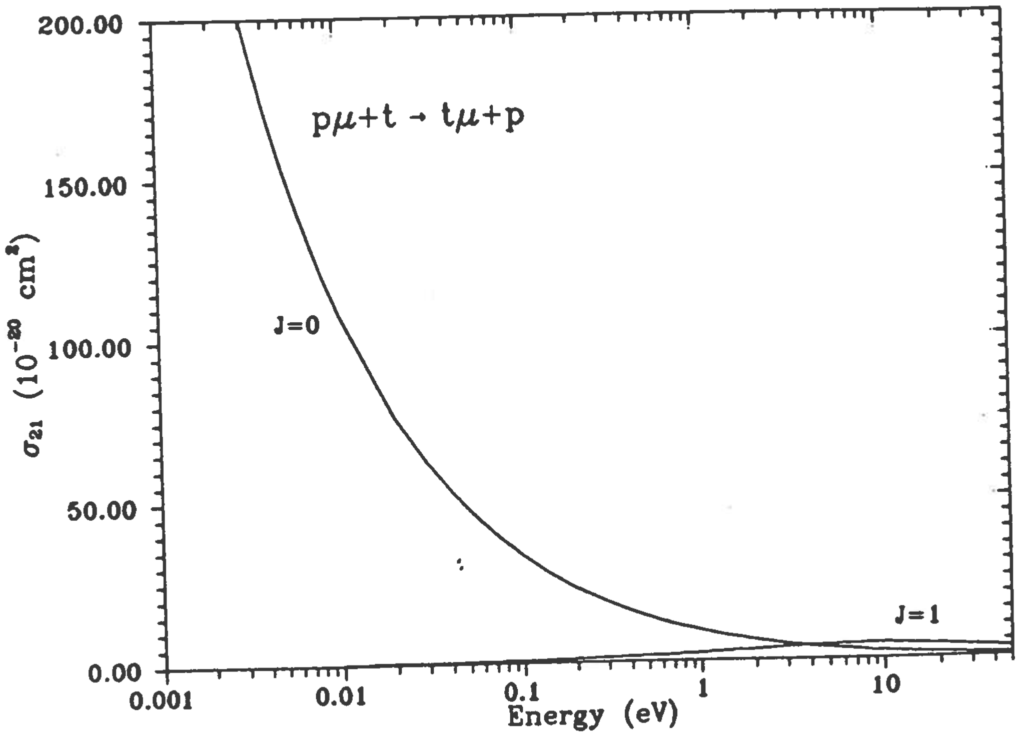

pμ+t → tμ+p
J=0
J=1
σ_{21} (10^{-20} cm^2)
200.00
150.00
100.00
50.00
0.00
0.001
0.01
0.1
1
10
Energy (eV)

Fig. 23

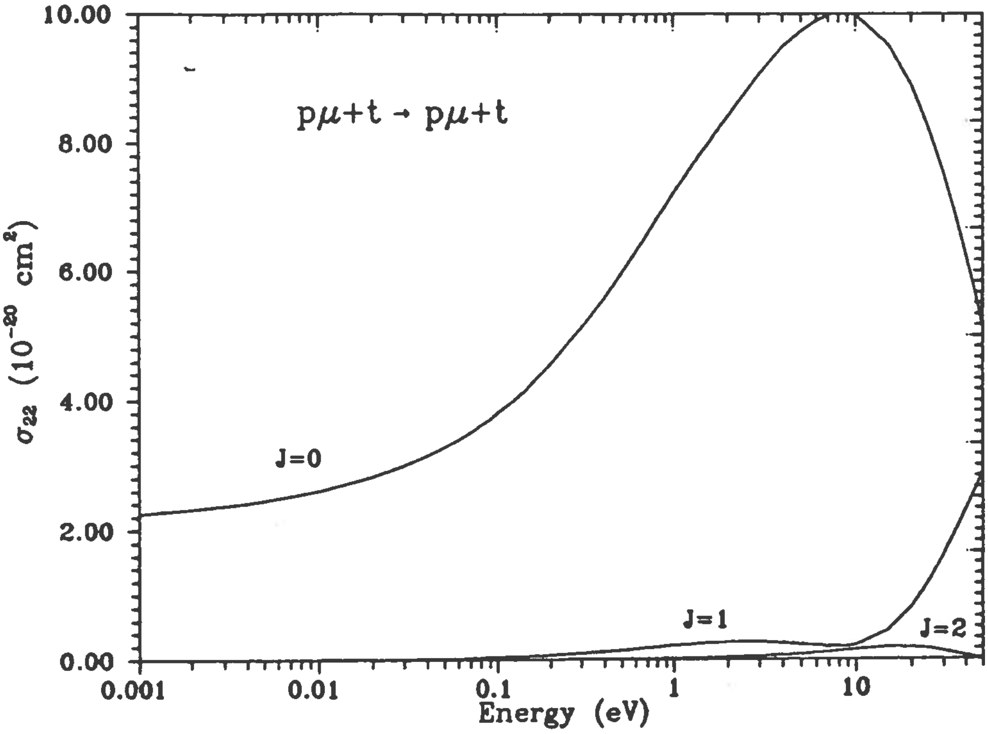


Fig. 24

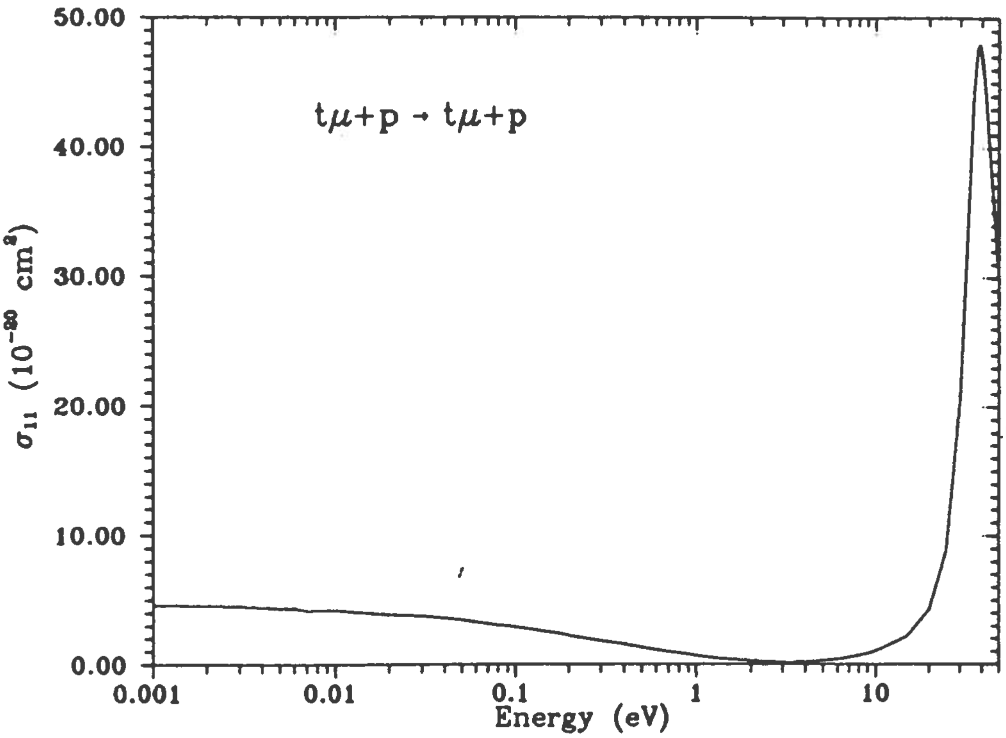


Fig. 25.a

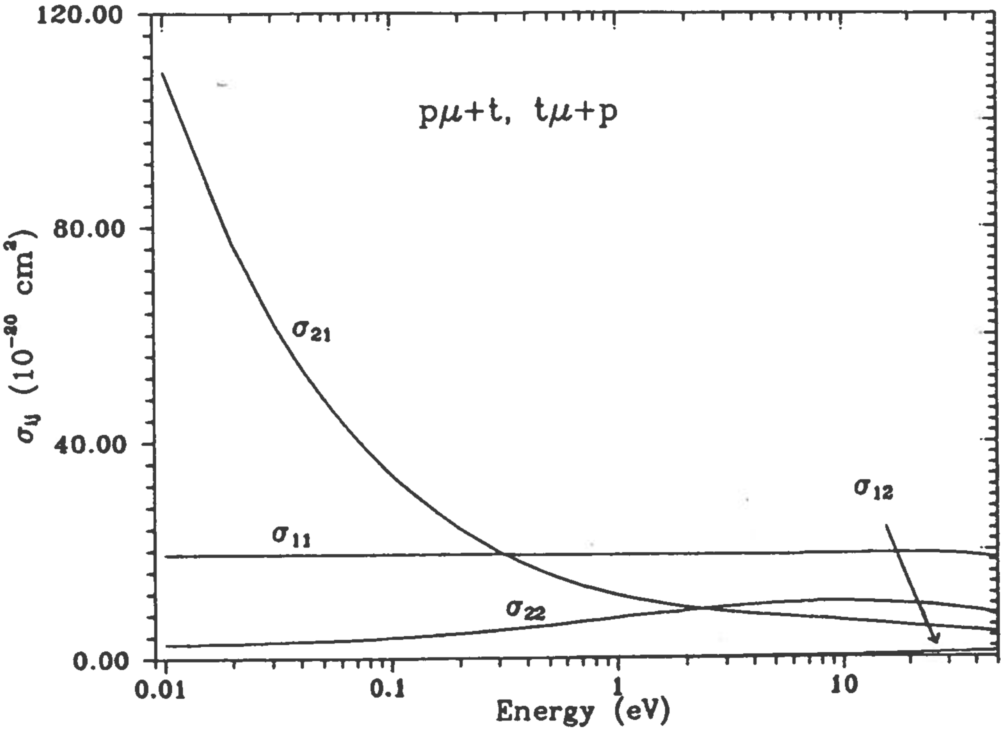


Fig. 25.b

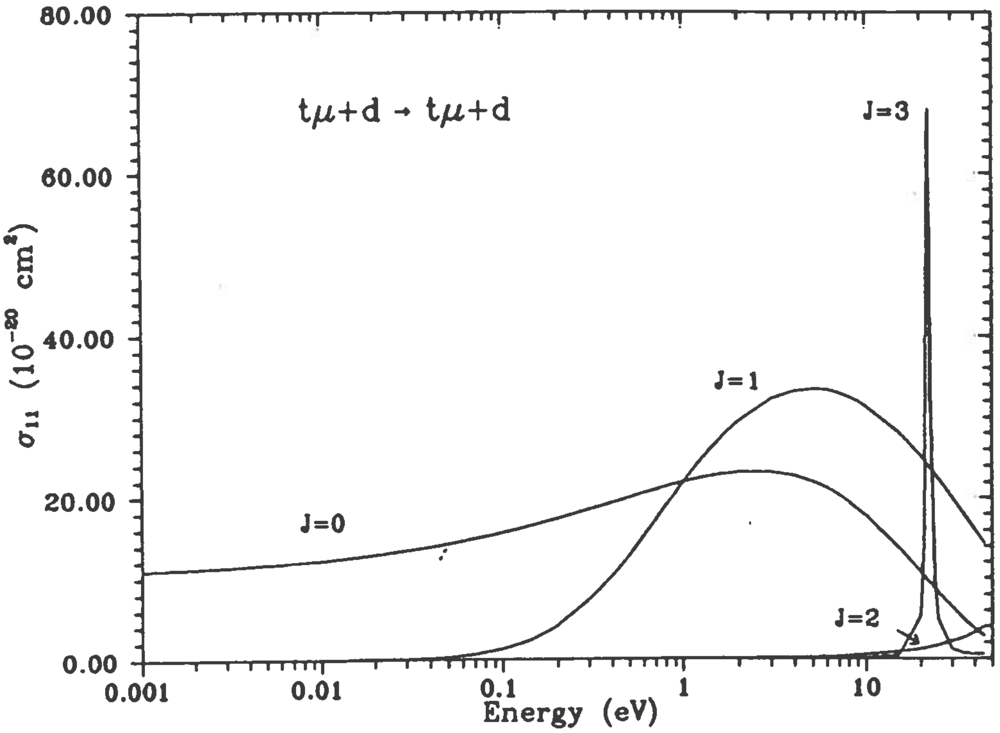


Fig. 26

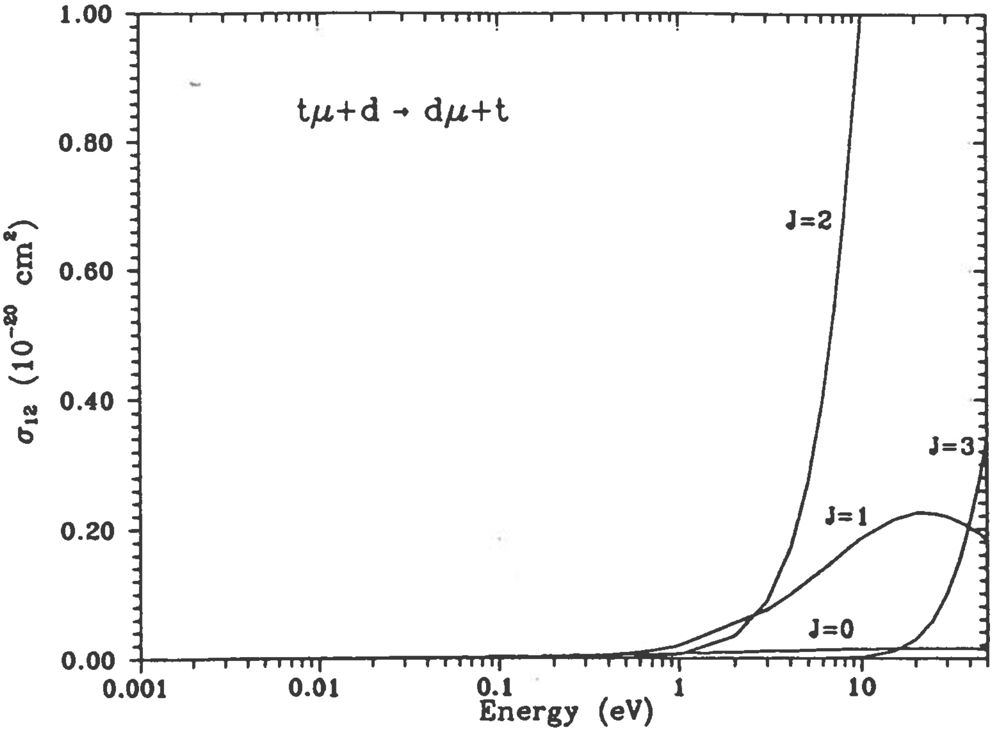

tμ+d → dμ+t
J=2
J=3
J=1
J=0
σ12 (10^-20 cm^2)
1.00
0.80
0.60
0.40
0.20
0.00
0.001
0.01
0.1
1
10
Energy (eV)

Fig. 27

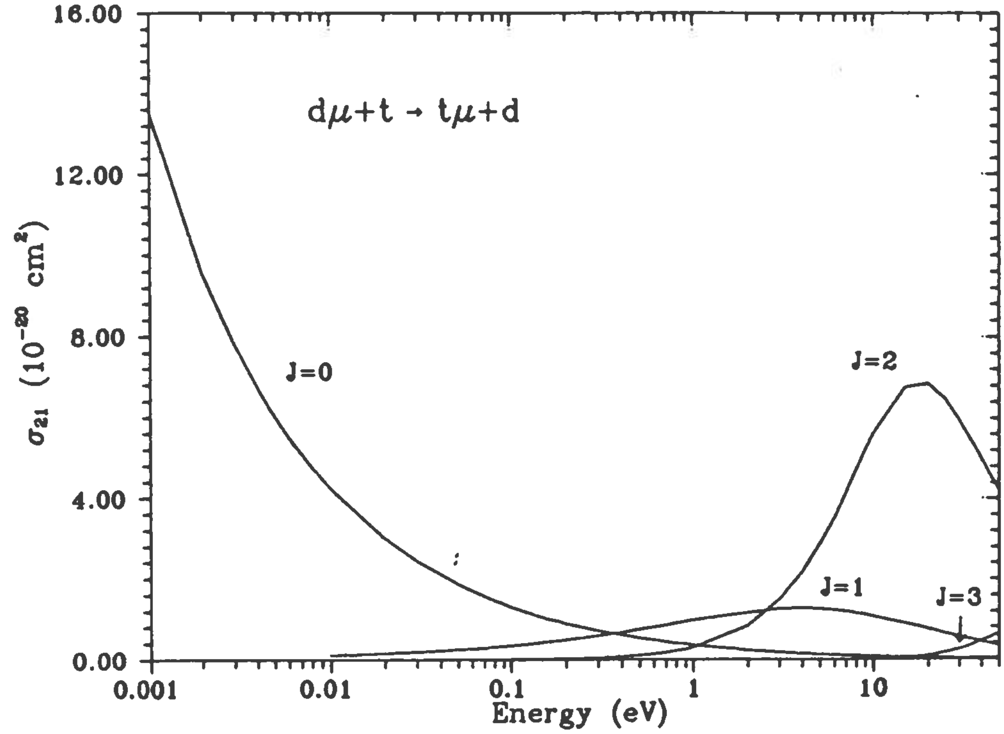

dμ+t → tμ+d
J=0
J=2
J=1
J=3
σ21 (10^-20 cm^2)
16.00
12.00
8.00
4.00
0.00
0.001
0.01
0.1
1
10
Energy (eV)

Fig. 28

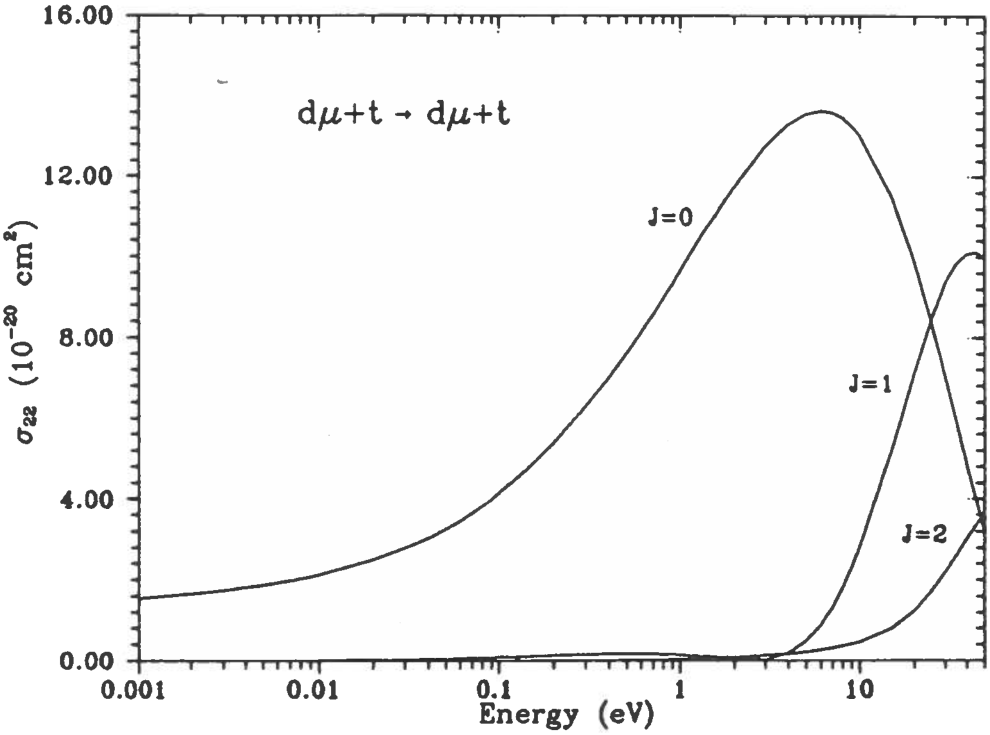


Fig. 29

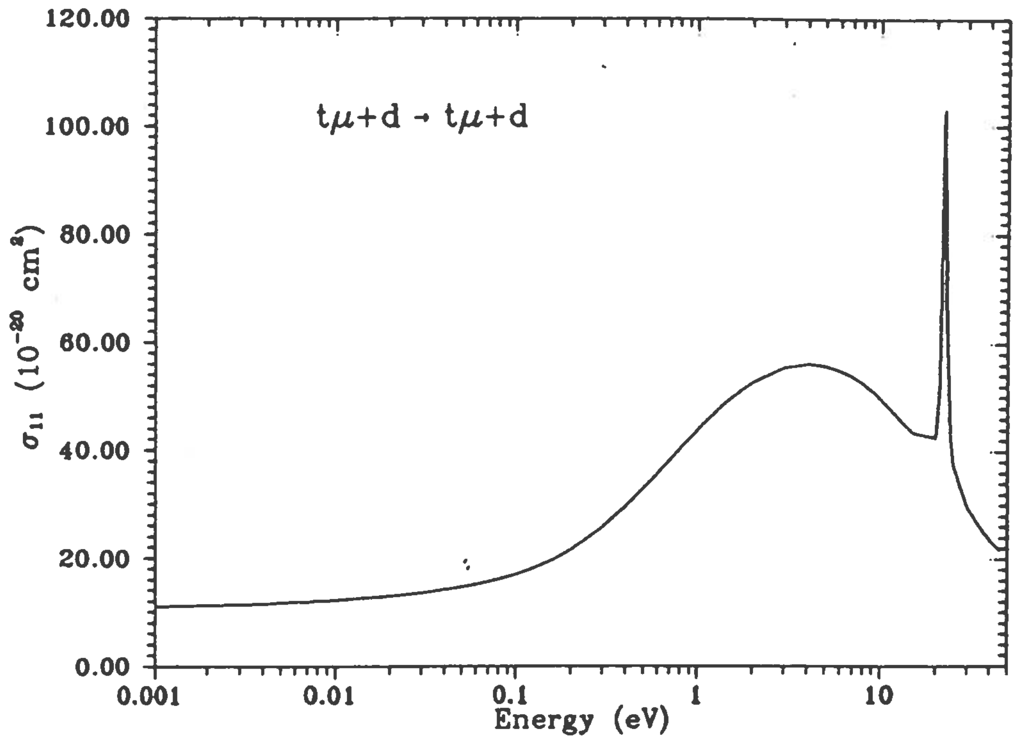


Fig. 30.a

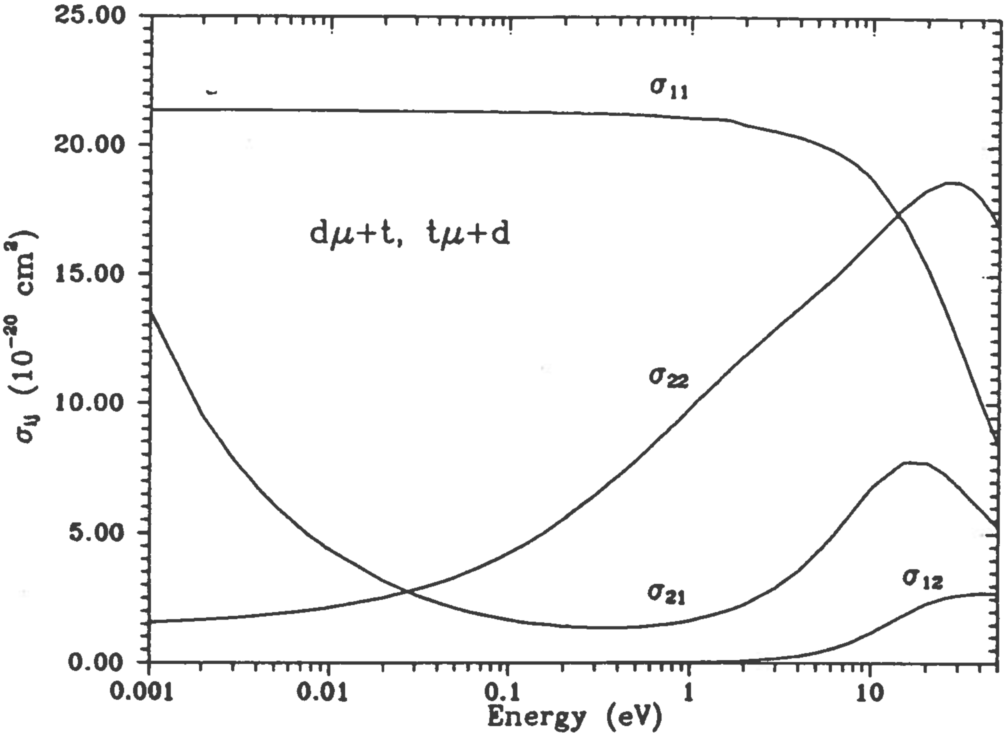

25.00
20.00
15.00
10.00
5.00
0.00
σij (10^-20 cm²)
dμ+t, tμ+d
σ11
σ22
σ21
σ12
0.001
0.01
0.1
1
10
Energy (eV)

Fig. 30.b

Table 1: (continue) T-matrix, $d\mu + p$.

ε_1(eV)	k_1	$J=0$	$J=1$	$J=2$	$J=3$
6.000	0.1198E+00	-0.9368E-01	0.8753E-02	0.1502E-01	0.4038E-02
7.000	0.1294E+00	-0.1140E+00	0.4633E-02	0.1836E-01	0.4727E-02
8.000	0.1383E+00	-0.1335E+00	-0.2500E-03	0.2216E-01	0.5435E-02
9.000	0.1467E+00	-0.1524E+00	-0.5779E-02	0.2629E-01	0.6153E-02
10.000	0.1546E+00	-0.1708E+00	-0.1181E-01	0.3085E-01	0.6891E-02
15.000	0.1894E+00	-0.2549E+00	-0.4748E-01	0.6177E-01	0.1073E-01
20.000	0.2186E+00	-0.3304E+00	-0.8748E-01	0.1111E+00	0.1491E-01
25.000	0.2445E+00	-0.3997E+00	-0.1290E+00	0.1925E+00	0.1930E-01
30.000	0.2678E+00	-0.4635E+00	-0.1707E+00	0.3317E+00	0.2409E-01
35.000	0.2892E+00	-0.5243E+00	-0.2119E+00	0.5937E+00	0.2917E-01
40.000	0.3092E+00	-0.5825E+00	-0.2524E+00	0.1193E+01	0.3473E-01
45.000	0.3280E+00	-0.6371E+00	-0.2921E+00	0.3572E+01	0.4085E-01
47.000	0.3352E+00			0.8881E+01	
49.000	0.3422E+00			-0.3266E+02	
50.000	0.3457E+00	-0.6872E+00	-0.3309E+00	-0.1059E+02	0.4744E-01
51.000	0.3491E+00			-0.6514E+01	
53.000	0.3559E+00			-0.3858E+01	
55.000	0.3626E+00			-0.2855E+01	

Table 2: T-matrix, $d\mu + p$, $p\mu + d$ $(J = 0)$.

ε_2(eV)	k_2	t_{11}	$t_{12} = t_{21}$	t_{22}
0.001	0.1671E-02	-0.8466E+00	0.5783E-01	-0.5167E-02
0.002	0.2363E-02	-0.8466E+00	0.6875E-01	-0.7354E-02
0.003	0.2895E-02	-0.8467E+00	0.7608E-01	-0.9050E-02
0.004	0.3342E-02	-0.8467E+00	0.8174E-01	-0.1049E-01
0.005	0.3737E-02	-0.8468E+00	0.8642E-01	-0.1177E-01
0.006	0.4094E-02	-0.8468E+00	0.9044E-01	-0.1294E-01
0.007	0.4422E-02	-0.8469E+00	0.9398E-01	-0.1401E-01
0.008	0.4727E-02	-0.8469E+00	0.9716E-01	-0.1502E-01
0.009	0.5014E-02	-0.8469E+00	0.1001E+00	-0.1597E-01
0.010	0.5285E-02	-0.8470E+00	0.1027E+00	-0.1687E-01
0.020	0.7474E-02	-0.8474E+00	0.1221E+00	-0.2430E-01
0.030	0.9154E-02	-0.8479E+00	0.1349E+00	-0.3016E-01
0.040	0.1057E-01	-0.8483E+00	0.1449E+00	-0.3521E-01
0.050	0.1182E-01	-0.8487E+00	0.1532E+00	-0.3974E-01
0.060	0.1295E-01	-0.8491E+00	0.1602E+00	-0.4390E-01
0.070	0.1398E-01	-0.8496E+00	0.1664E+00	-0.4777E-01
0.080	0.1495E-01	-0.8500E+00	0.1719E+00	-0.5142E-01
0.090	0.1585E-01	-0.8504E+00	0.1770E+00	-0.5489E-01
0.100	0.1671E-01	-0.8508E+00	0.1816E+00	-0.5820E-01
0.120	0.1831E-01	-0.8516E+00	0.1900E+00	-0.6445E-01
0.140	0.1977E-01	-0.8525E+00	0.1973E+00	-0.7029E-01
0.160	0.2114E-01	-0.8533E+00	0.2039E+00	-0.7581E-01
0.180	0.2242E-01	-0.8541E+00	0.2098E+00	-0.8106E-01
0.200	0.2363E-01	-0.8549E+00	0.2154E+00	-0.8609E-01
0.300	0.2895E-01	-0.8589E+00	0.2379E+00	-0.1087E+00
0.400	0.3342E-01	-0.8628E+00	0.2554E+00	-0.1286E+00
0.500	0.3737E-01	-0.8666E+00	0.2700E+00	-0.1466E+00
0.600	0.4094E-01	-0.8705E+00	0.2826E+00	-0.1632E+00
0.700	0.4422E-01	-0.8743E+00	0.2939E+00	-0.1788E+00
0.800	0.4727E-01	-0.8781E+00	0.3042E+00	-0.1935E+00
0.900	0.5014E-01	-0.8819E+00	0.3136E+00	-0.2074E+00
1.000	0.5285E-01	-0.8857E+00	0.3224E+00	-0.2208E+00
1.200	0.5789E-01	-0.8932E+00	0.3385E+00	-0.2460E+00
1.400	0.6253E-01	-0.9008E+00	0.3530E+00	-0.2697E+00
1.600	0.6685E-01	-0.9083E+00	0.3664E+00	-0.2921E+00
1.800	0.7090E-01	-0.9158E+00	0.3789E+00	-0.3135E+00
2.000	0.7474E-01	-0.9234E+00	0.3907E+00	-0.3341E+00
3.000	0.9154E-01	-0.9610E+00	0.4430E+00	-0.4292E+00
4.000	0.1057E+00	-0.9990E+00	0.4898E+00	-0.5163E+00
5.000	0.1182E+00	-0.1038E+01	0.5347E+00	-0.5994E+00

Table A: The isotope exchange rate $\lambda = \sigma_{21} v N_0 [10^8 s^{-1}]$ of the reaction $d\mu + t \to t\mu + d$ (theoretical calculations and experimental results).

ε_2(eV)	M. Bubak and M. Faifman, 1987 [12]	J. Cohen, 1990 [14]	V. Melezhik, 1987 [21]	M. Kamimura, 1987 [15]	Our results
0.001				2.7	2.26
0.01			2.6	2.7	2.31
0.04	1.9	3.5	2.7	2.9	2.46
0.1			2.7	3.2	2.78
0.4				5.0	4.58
1.0				8.9	8.69

Temperature	Experimental exchange rate	References
90–610 K	2.9 ± 0.4	V.M. Bystritsky e al. 1980 [23]
100–400 K	2.8 ± 0.3	S. Jones et al. 1987 [24]
23 K	2.8 ± 0.5 3.5 ± 0.5	W. Breunlich et al. 1986 [25] The results depend on the fit choice

Table 2: (continue) T-matrix, $d\mu + p$, $p\mu + d$ ($J = 0$).

ε_2(eV)	k_2	t_{11}	$t_{12} = t_{21}$	t_{22}
6.000	0.1295E+00	-0.1078E+01	0.5792E+00	-0.6806E+00
7.000	0.1398E+00	-0.1120E+01	0.6246E+00	-0.7617E+00
8.000	0.1495E+00	-0.1163E+01	0.6715E+00	-0.8440E+00
9.000	0.1585E+00	-0.1209E+01	0.7208E+00	-0.9285E+00
10.000	0.1671E+00	-0.1257E+01	0.7728E+00	-0.1016E+01
15.000	0.2047E+00	-0.1557E+01	0.1101E+01	-0.1527E+01
20.000	0.2363E+00	-0.1983E+01	0.1602E+01	-0.2262E+01
25.000	0.2642E+00	-0.2908E+01	0.2697E+01	-0.3719E+01
30.000	0.2895E+00	-0.5388E+01	0.5802E+01	-0.7759E+01
35.000	0.3127E+00	-0.1692E+03	0.2153E+03	-0.2757E+03
40.000	0.3342E+00	0.4714E+01	-0.7260E+01	0.8821E+01
45.000	0.3545E+00	0.1991E+01	-0.3852E+01	0.4405E+01
50.000	0.3737E+00	0.1077E+01	-0.2756E+01	0.2942E+01

Table 3: T-matrix, $d\mu + p$, $p\mu + d$ ($J = 1$).

ε_2(eV)	k_2	t_{11}	$t_{12} = t_{21}$	t_{22}
0.010	0.5285E-02	-0.7003E+00	0.1858E-02	0.1702E-03
0.020	0.7474E-02	-0.7002E+00	0.3126E-02	0.3405E-03
0.030	0.9154E-02	-0.7002E+00	0.4238E-02	0.5106E-03
0.040	0.1057E-01	-0.7001E+00	0.5259E-02	0.6802E-03
0.050	0.1182E-01	-0.7000E+00	0.6219E-02	0.8492E-03
0.060	0.1295E-01	-0.7000E+00	0.7130E-02	0.1017E-02
0.070	0.1398E-01	-0.6999E+00	0.8005E-02	0.1185E-02
0.080	0.1495E-01	-0.6999E+00	0.8849E-02	0.1351E-02
0.090	0.1585E-01	-0.6998E+00	0.9667E-02	0.1517E-02
0.100	0.1671E-01	-0.6997E+00	0.1046E-01	0.1681E-02
0.120	0.1831E-01	-0.6998E+00	0.1200E-01	0.2006E-02
0.140	0.1977E-01	-0.6997E+00	0.1347E-01	0.2326E-02
0.160	0.2114E-01	-0.6995E+00	0.1489E-01	0.2641E-02
0.180	0.2242E-01	-0.6994E+00	0.1626E-01	0.2951E-02
0.200	0.2363E-01	-0.6993E+00	0.1761E-01	0.3255E-02
0.300	0.2895E-01	-0.6987E+00	0.2386E-01	0.4691E-02
0.400	0.3342E-01	-0.6981E+00	0.2961E-01	0.5985E-02
0.500	0.3737E-01	-0.6976E+00	0.3499E-01	0.7145E-02
0.600	0.4094E-01	-0.6970E+00	0.4010E-01	0.8181E-02
0.700	0.4422E-01	-0.6965E+00	0.4498E-01	0.9108E-02
0.800	0.4727E-01	-0.6960E+00	0.4967E-01	0.9940E-02
0.900	0.5014E-01	-0.6955E+00	0.5421E-01	0.1069E-01
1.000	0.5285E-01	-0.6948E+00	0.5861E-01	0.1138E-01
1.200	0.5789E-01	-0.6940E+00	0.6704E-01	0.1255E-01
1.400	0.6253E-01	-0.6931E+00	0.7506E-01	0.1356E-01
1.600	0.6685E-01	-0.6923E+00	0.8274E-01	0.1442E-01
1.800	0.7090E-01	-0.6915E+00	0.9010E-01	0.1518E-01
2.000	0.7474E-01	-0.6906E+00	0.9720E-01	0.1585E-01
3.000	0.9154E-01	-0.6877E+00	0.1293E+00	0.1757E-01
4.000	0.1057E+00	-0.6860E+00	0.1569E+00	0.1664E-01
5.000	0.1182E+00	-0.6854E+00	0.1813E+00	0.1344E-01
6.000	0.1295E+00	-0.6858E+00	0.2033E+00	0.8608E-02
7.000	0.1398E+00	-0.6870E+00	0.2234E+00	0.2533E-02
8.000	0.1495E+00	-0.6890E+00	0.2418E+00	-0.4638E-02
9.000	0.1585E+00	-0.6918E+00	0.2590E+00	-0.1281E-01
10.000	0.1671E+00	-0.6952E+00	0.2752E+00	-0.2187E-01
15.000	0.2047E+00	-0.7214E+00	0.3447E+00	-0.7516E-01
20.000	0.2363E+00	-0.7587E+00	0.4017E+00	-0.1353E+00
25.000	0.2642E+00	-0.8036E+00	0.4525E+00	-0.1993E+00
30.000	0.2895E+00	-0.8552E+00	0.4999E+00	-0.2659E+00
35.000	0.3127E+00	-0.9131E+00	0.5468E+00	-0.3353E+00
40.000	0.3342E+00	-0.9775E+00	0.5951E+00	-0.4069E+00
45.000	0.3545E+00	-0.1048E+01	0.6468E+00	-0.4825E+00
50.000	0.3737E+00	-0.1125E+01	0.7029E+00	-0.5623E+00

Table 4: T-matrix, $d\mu + p$, $p\mu + d$ $(J = 2)$.

ε_2(eV)	k_2	t_{11}	$t_{12} = t_{21}$	t_{22}
0.100	0.1671E-01	-0.1120E+01	-0.3402E-05	0.2402E-03
0.200	0.2363E-01	-0.1121E+01	-0.8784E-05	0.4830E-03
0.300	0.2895E-01	-0.1121E+01	-0.1566E-04	0.7283E-03
0.400	0.3342E-01	-0.1122E+01	-0.2388E-04	0.9757E-03
0.500	0.3737E-01	-0.1122E+01	-0.3335E-04	0.1225E-02
0.600	0.4094E-01	-0.1123E+01	-0.4398E-04	0.1474E-02
0.700	0.4422E-01	-0.1123E+01	-0.5569E-04	0.1725E-02
0.800	0.4727E-01	-0.1124E+01	-0.6836E-04	0.1975E-02
0.900	0.5014E-01	-0.1124E+01	-0.8199E-04	0.2226E-02
1.000	0.5285E-01	-0.1125E+01	-0.9639E-04	0.2476E-02
1.200	0.5789E-01	-0.1126E+01	-0.1274E-03	0.2974E-02
1.400	0.6253E-01	-0.1127E+01	-0.1608E-03	0.3470E-02
1.600	0.6685E-01	-0.1128E+01	-0.1958E-03	0.3963E-02
1.800	0.7090E-01	-0.1129E+01	-0.2320E-03	0.4453E-02
2.000	0.7474E-01	-0.1130E+01	-0.2688E-03	0.4940E-02
3.000	0.9154E-01	-0.1135E+01	-0.4453E-03	0.7322E-02
4.000	0.1057E+00	-0.1140E+01	-0.5783E-03	0.9592E-02
5.000	0.1182E+00	-0.1145E+01	-0.6439E-03	0.1176E-01
6.000	0.1295E+00	-0.1150E+01	-0.6360E-03	0.1387E-01
7.000	0.1398E+00	-0.1155E+01	-0.5574E-03	0.1591E-01
8.000	0.1495E+00	-0.1160E+01	-0.4150E-03	0.1782E-01
9.000	0.1585E+00	-0.1166E+01	-0.2148E-03	0.1959E-01
10.000	0.1671E+00	-0.1171E+01	0.3935E-04	0.2119E-01
15.000	0.2047E+00	-0.1197E+01	0.2129E-02	0.2666E-01
20.000	0.2363E+00	-0.1224E+01	0.5617E-02	0.2754E-01
25.000	0.2642E+00	-0.1252E+01	0.1029E-01	0.2445E-01
30.000	0.2895E+00	-0.1281E+01	0.1600E-01	0.1787E-01
35.000	0.3127E+00	-0.1312E+01	0.2268E-01	0.8739E-02
40.000	0.3342E+00	-0.1343E+01	0.3010E-01	-0.3046E-02
45.000	0.3545E+00	-0.1374E+01	0.3813E-01	-0.1614E-01
50.000	0.3737E+00	-0.1406E+01	0.4670E-01	-0.3105E-01

Table 5: *T*-matrix, $d\mu + p$, $p\mu + d$ ($J = 3$).

ε_2(eV)	k_2	t_{11}	$t_{12} = t_{21}$	t_{22}
1.000	0.5285E-01	0.3765E+00	0.3263E-03	0.8046E-03
1.200	0.5789E-01	0.3781E+00	0.4462E-03	0.9658E-03
1.400	0.6253E-01	0.3797E+00	0.5810E-03	0.1126E-02
1.600	0.6685E-01	0.3813E+00	0.7300E-03	0.1286E-02
1.800	0.7090E-01	0.3829E+00	0.8924E-03	0.1444E-02
2.000	0.7474E-01	0.3845E+00	0.1068E-02	0.1602E-02
3.000	0.9154E-01	0.3927E+00	0.2131E-02	0.2399E-02
4.000	0.1057E+00	0.4010E+00	0.3484E-02	0.3229E-02
5.000	0.1182E+00	0.4095E+00	0.5115E-02	0.4082E-02
6.000	0.1295E+00	0.4182E+00	0.7016E-02	0.4952E-02
7.000	0.1398E+00	0.4271E+00	0.9181E-02	0.5860E-02
8.000	0.1495E+00	0.4362E+00	0.1161E-01	0.6833E-02
9.000	0.1585E+00	0.4456E+00	0.1426E-01	0.7877E-02
10.000	0.1671E+00	0.4552E+00	0.1716E-01	0.8976E-02
15.000	0.2047E+00	0.5076E+00	0.3497E-01	0.1510E-01
20.000	0.2363E+00	0.5675E+00	0.5802E-01	0.2215E-01
25.000	0.2642E+00	0.6351E+00	0.8615E-01	0.3009E-01
30.000	0.2895E+00	0.7110E+00	0.1192E+00	0.3897E-01
35.000	0.3127E+00	0.7967E+00	0.1577E+00	0.4897E-01
40.000	0.3342E+00	0.8944E+00	0.2018E+00	0.6065E-01
45.000	0.3545E+00	0.1006E+01	0.2517E+00	0.7349E-01
50.000	0.3737E+00	0.1130E+01	0.3077E+00	0.8877E-01

Table 6: T-matrix, $t\mu + p$.

ε_1(eV)	k_1	$J=0$	$J=1$	$J=2$	$J=3$
0.001	0.1603E-02	0.3644E-02			
0.002	0.2268E-02	0.5120E-02			
0.003	0.2777E-02	0.6227E-02			
0.004	0.3207E-02	0.7124E-02			
0.005	0.3585E-02	0.7933E-02			
0.006	0.3928E-02	0.8661E-02			
0.007	0.4242E-02	0.9172E-02			
0.008	0.4535E-02	0.9875E-02			
0.009	0.4810E-02	0.1046E-01			
0.010	0.5070E-02	0.1099E-01	0.1618E-03		
0.020	0.7171E-02	0.1490E-01	0.3199E-03		
0.030	0.8782E-02	0.1797E-01	0.4743E-03		
0.040	0.1014E-01	0.2040E-01	0.6252E-03		
0.050	0.1134E-01	0.2227E-01	0.7761E-03		
0.060	0.1242E-01	0.2381E-01	0.9246E-03		
0.070	0.1341E-01	0.2521E-01	0.1072E-02		
0.080	0.1434E-01	0.2643E-01	0.1213E-02		
0.090	0.1521E-01	0.2773E-01	0.1359E-02		
0.100	0.1603E-01	0.2878E-01	0.1498E-02	0.2388E-03	
0.120	0.1756E-01	0.3051E-01	0.1773E-02	0.2856E-03	
0.140	0.1897E-01	0.3212E-01	0.2060E-02	0.3340E-03	
0.160	0.2028E-01	0.3348E-01	0.2330E-02	0.3818E-03	
0.180	0.2151E-01	0.3465E-01	0.2592E-02	0.4301E-03	
0.200	0.2268E-01	0.3567E-01	0.2853E-02	0.4779E-03	
0.300	0.2777E-01	0.3918E-01	0.4103E-02	0.7167E-03	
0.400	0.3207E-01	0.4118E-01	0.5258E-02	0.9635E-03	
0.500	0.3585E-01	0.4187E-01	0.6364E-02	0.1206E-02	
0.600	0.3928E-01	0.4197E-01	0.7375E-02	0.1452E-02	
0.700	0.4242E-01	0.4172E-01	0.8202E-02	0.1686E-02	
0.800	0.4535E-01	0.4096E-01	0.9155E-02	0.1943E-02	
0.900	0.4810E-01	0.4004E-01	0.1002E-01	0.2200E-02	
1.000	0.5070E-01	0.3881E-01	0.1074E-01	0.2441E-02	0.7940E-03
1.200	0.5554E-01	0.3591E-01	0.1214E-01	0.2962E-02	0.9506E-03
1.400	0.5999E-01	0.3254E-01	0.1337E-01	0.3465E-02	0.1109E-02
1.600	0.6414E-01	0.2881E-01	0.1452E-01	0.3997E-02	0.1280E-02
1.800	0.6803E-01	0.2485E-01	0.1549E-01	0.4528E-02	0.1428E-02
2.000	0.7171E-01	0.2070E-01	0.1634E-01	0.5077E-02	0.1597E-02
3.000	0.8782E-01	-0.1438E-02	0.1901E-01	0.7929E-02	0.2366E-02
4.000	0.1014E+00	-0.2424E-01	0.1949E-01	0.1109E-01	0.3190E-02
5.000	0.1134E+00	-0.4677E-01	0.1823E-01	0.1458E-01	0.4000E-02

Table 6: (continue) T-matrix, $t\mu + p$.

ε_1(eV)	k_1	$J=0$	$J=1$	$J=2$	$J=3$
6.000	0.1242E+00	-0.6875E-01	0.1559E-01	0.1852E-01	0.4822E-02
7.000	0.1341E+00	-0.9010E-01	0.1190E-01	0.2299E-01	0.5642E-02
8.000	0.1434E+00	-0.1108E+00	0.7326E-02	0.2800E-01	0.6479E-02
9.000	0.1521E+00	-0.1309E+00	0.2026E-02	0.3352E-01	0.7326E-02
10.000	0.1603E+00	-0.1505E+00	-0.3882E-02	0.3977E-01	0.8186E-02
15.000	0.1964E+00	-0.2412E+00	-0.3934E-01	0.8451E-01	0.1264E-01
20.000	0.2268E+00	-0.3227E+00	-0.7985E-01	0.1650E+00	0.1744E-01
25.000	0.2535E+00	-0.3984E+00	-0.1220E+00	0.3190E+00	0.2258E-01
30.000	0.2777E+00	-0.4697E+00	-0.1650E+00	0.6586E+00	0.2817E-01
35.000	0.3000E+00	-0.5382E+00	-0.2069E+00	0.1763E+01	0.3425E-01
36.000	0.3042E+00			0.2338E+01	
37.000	0.3084E+00			0.3318E+01	
38.000	0.3126E+00			0.5365E+01	
39.000	0.3166E+00			0.1222E+02	
40.000	0.3207E+00	-0.6043E+00	-0.2484E+00	-0.7439E+02	0.4100E-01
41.000	0.3247E+00			-0.9973E+01	
42.000	0.3286E+00			-0.5572E+01	
43.000	0.3325E+00			-0.3972E+01	
44.000	0.3363E+00			-0.3146E+01	
45.000	0.3401E+00	-0.6687E+00	-0.2891E+00	-0.2644E+01	0.4842E-01
50.000	0.3585E+00	-0.7337E+00	-0.3290E+00	-0.1642E+01	0.5667E-01

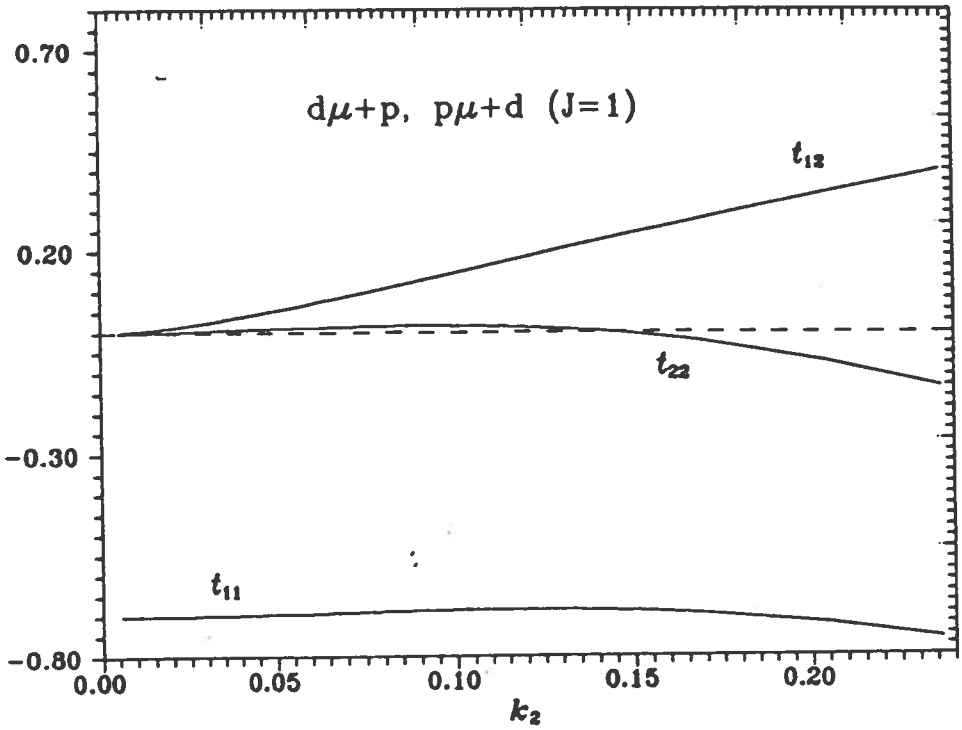

0.70
0.20
−0.30
−0.80
0.00
0.05
0.10
0.15
0.20
dμ+p, pμ+d (J=1)
t_{12}
t_{22}
t_{11}
k_2

Fig. 3

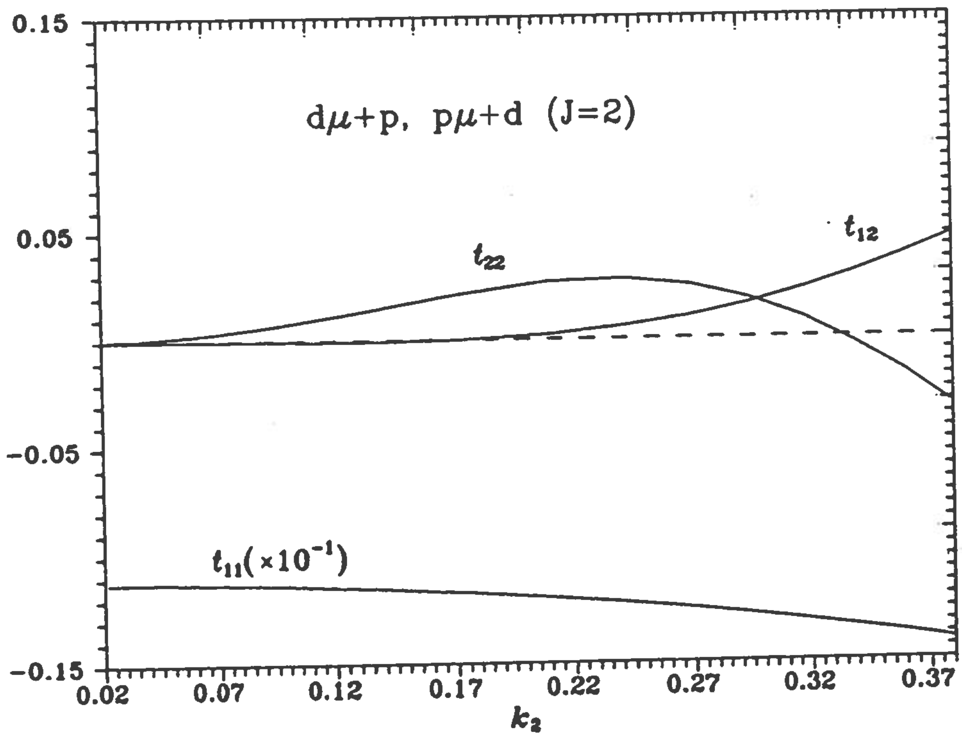

0.15
0.05
−0.05
−0.15
0.02
0.07
0.12
0.17
0.22
0.27
0.32
0.37
dμ+p, pμ+d (J=2)
t_{12}
t_{22}
$t_{11}(\times 10^{-1})$
k_2

Fig. 4

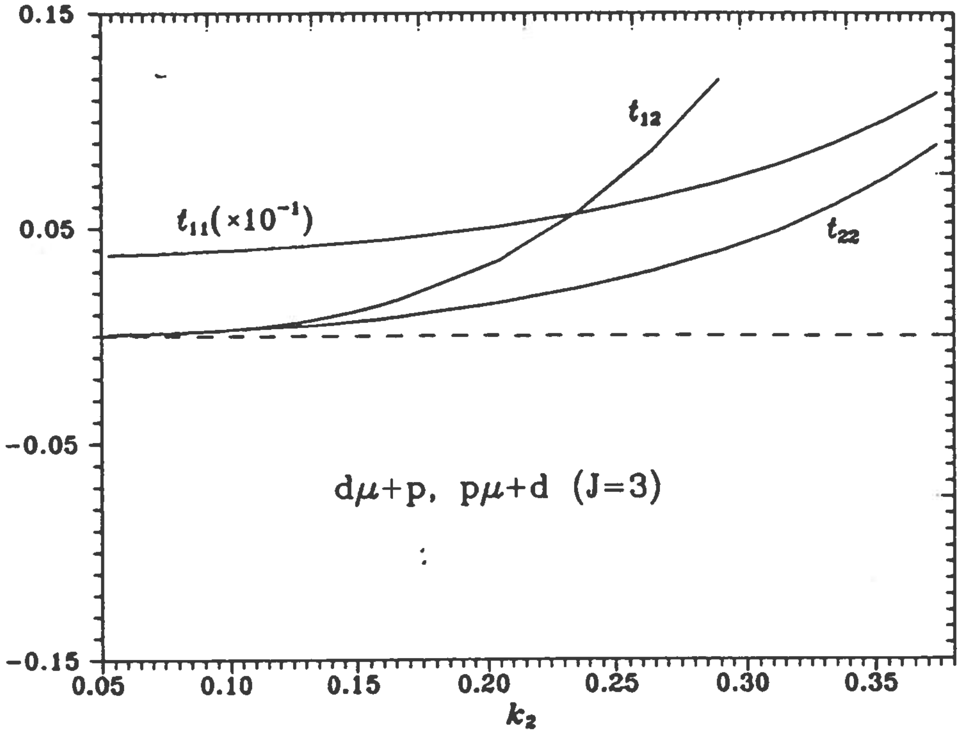

0.15
0.05
−0.05
−0.15
0.05
0.10
0.15
0.20
0.25
0.30
0.35
k_2
t_{12}
$t_{11}(\times 10^{-1})$
t_{22}
dμ+p, pμ+d (J=3)

Fig. 5

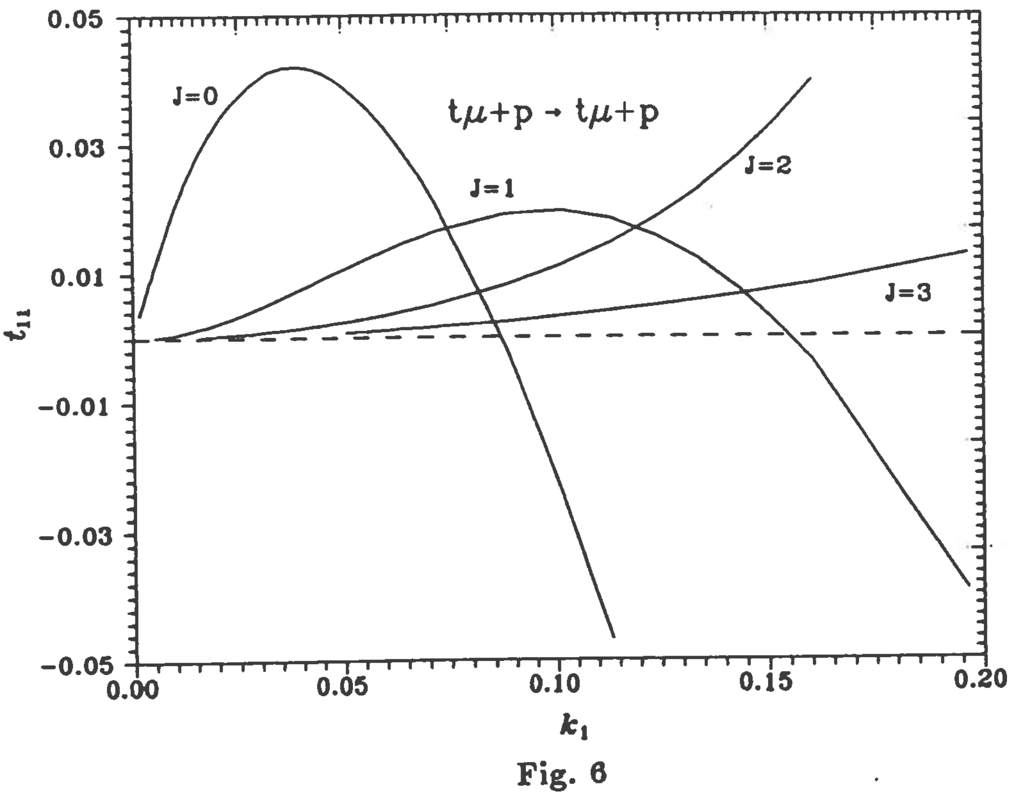

0.05
0.03
0.01
−0.01
−0.03
−0.05
0.00
0.05
0.10
0.15
0.20
k_1
t_{11}
J=0
J=1
J=2
J=3
tμ+p → tμ+p

Fig. 6

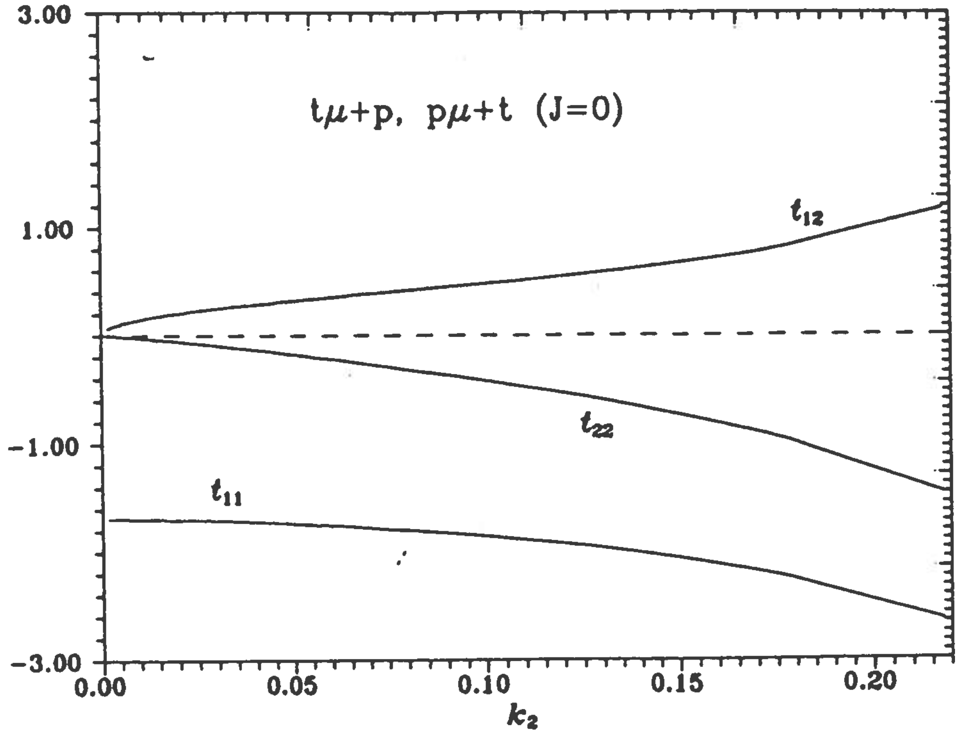

3.00
1.00
−1.00
−3.00
0.00
0.05
0.10
0.15
0.20
k_2
tμ+p, pμ+t (J=0)
t_{12}
t_{22}
t_{11}

Fig. 7

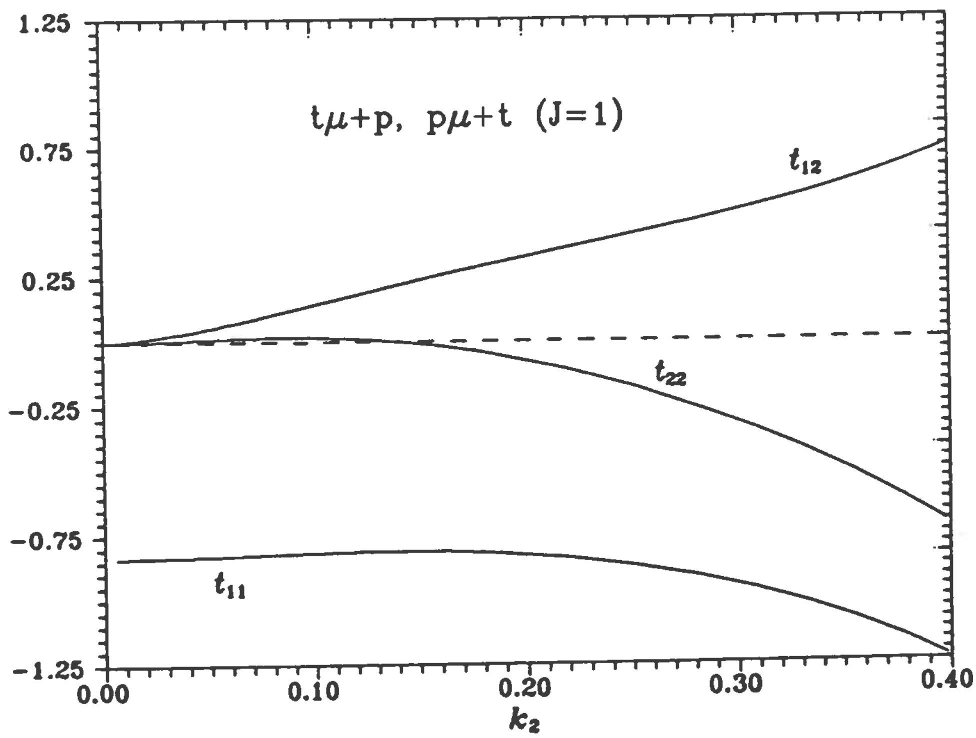

1.25
0.75
0.25
−0.25
−0.75
−1.25
0.00
0.10
0.20
0.30
0.40
k_2
tμ+p, pμ+t (J=1)
t_{12}
t_{22}
t_{11}

Fig. 8

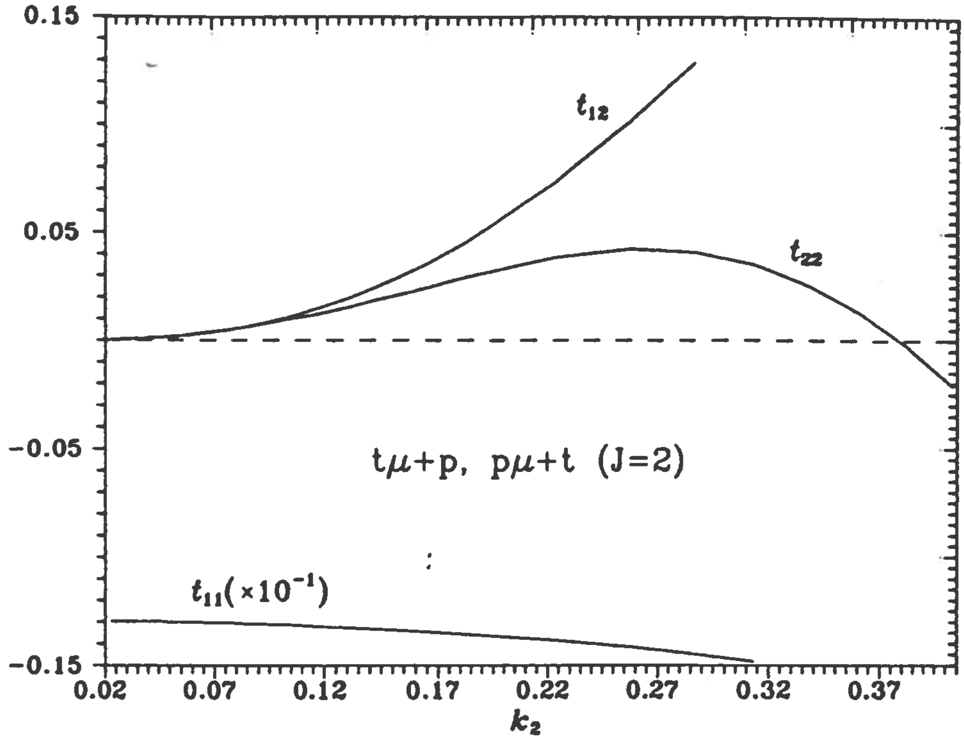

0.15
0.05
−0.05
−0.15
0.02
0.07
0.12
0.17
0.22
0.27
0.32
0.37
k_2
t_{12}
t_{22}
$t\mu+p,\ p\mu+t\ (J=2)$
$t_{11}(\times 10^{-1})$

Fig. 9

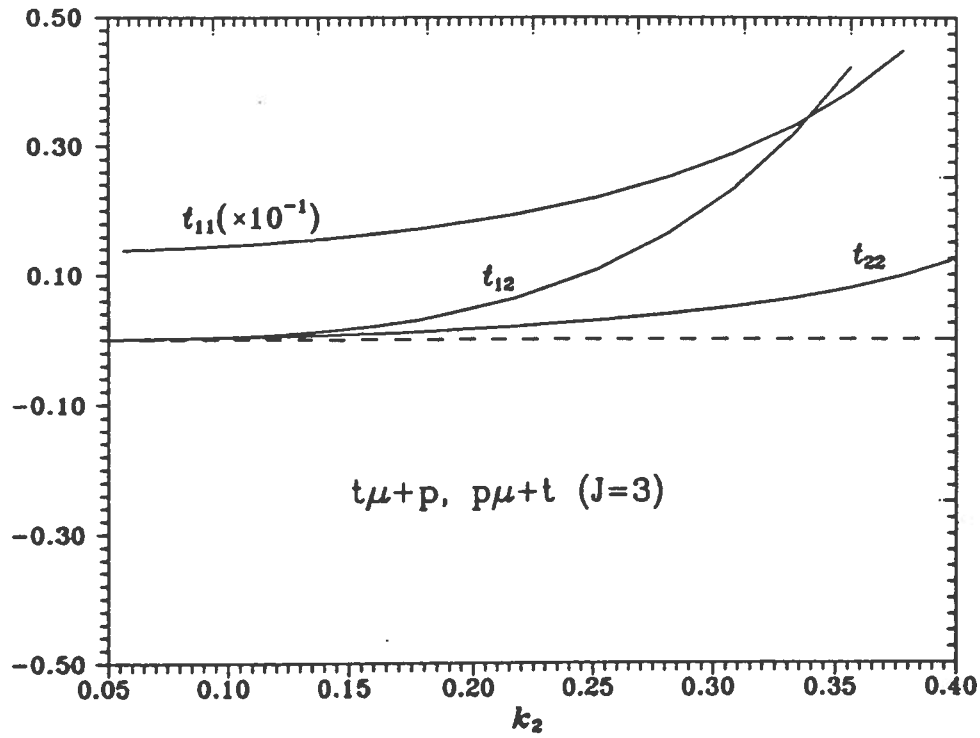

0.50
0.30
0.10
−0.10
−0.30
−0.50
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.40
k_2
$t_{11}(\times 10^{-1})$
t_{12}
t_{22}
$t\mu+p,\ p\mu+t\ (J=3)$

Fig. 10

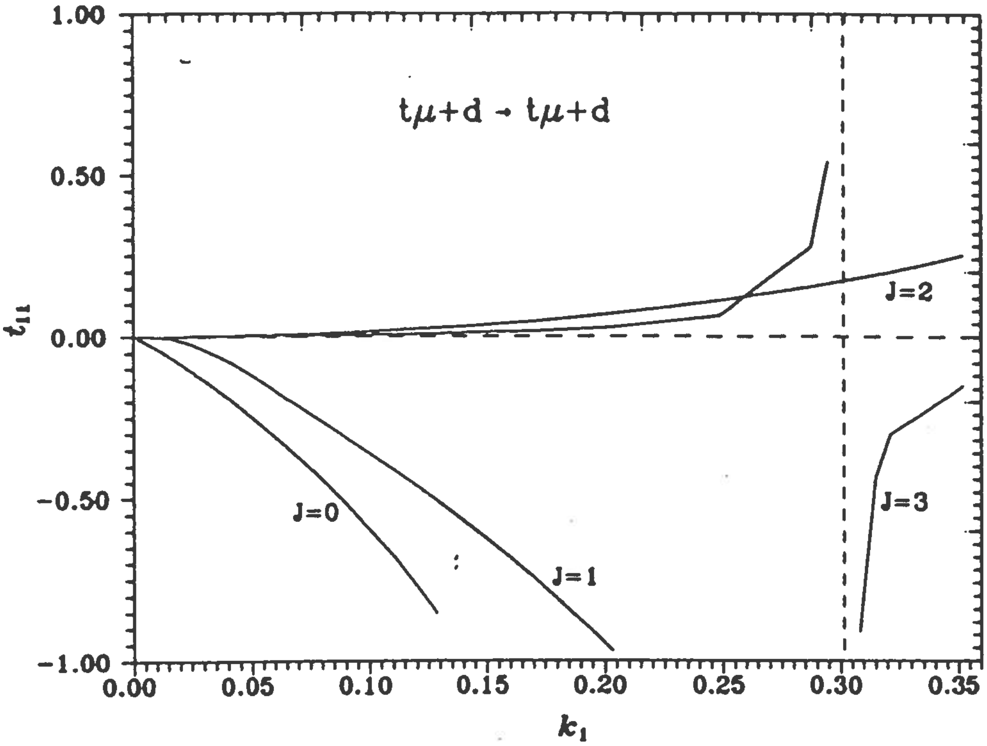

tμ+d → tμ+d
J=0
J=1
J=2
J=3
t_{11}
k_1
1.00
0.50
0.00
-0.50
-1.00
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35

Fig. 11

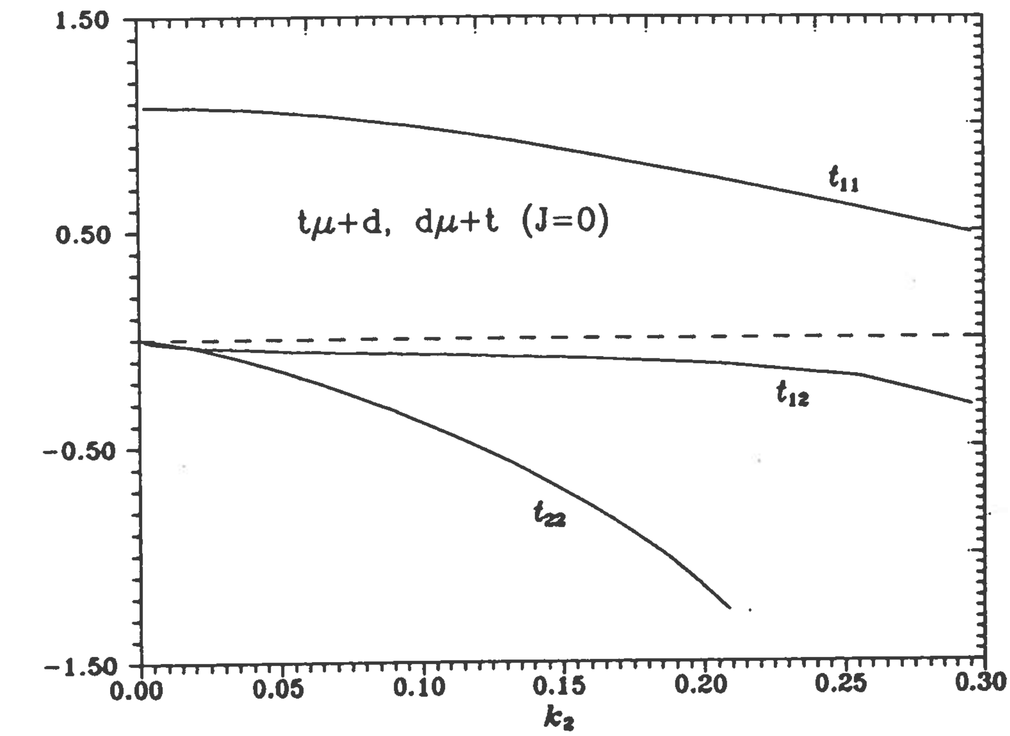

tμ+d, dμ+t (J=0)
t_{11}
t_{12}
t_{22}
k_2
1.50
0.50
-0.50
-1.50
0.00
0.05
0.10
0.15
0.20
0.25
0.30

Fig. 12

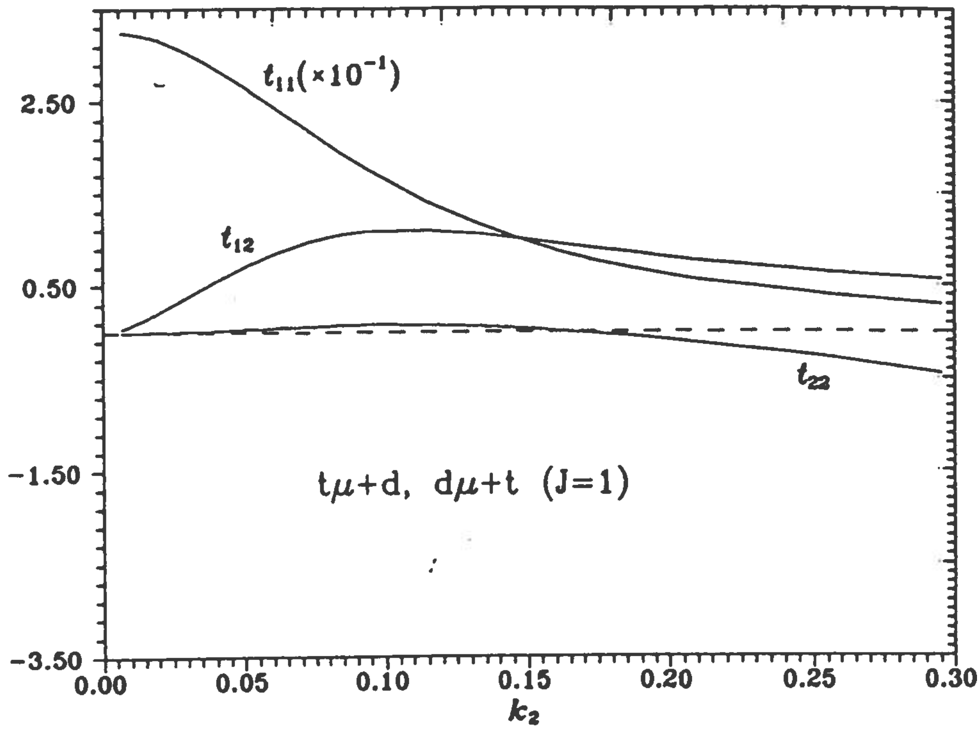

$t_{11}(\times 10^{-1})$
t_{12}
t_{22}
tμ+d, dμ+t (J=1)
2.50
0.50
−1.50
−3.50
0.00
0.05
0.10
0.15
0.20
0.25
0.30
k_2

Fig. 13

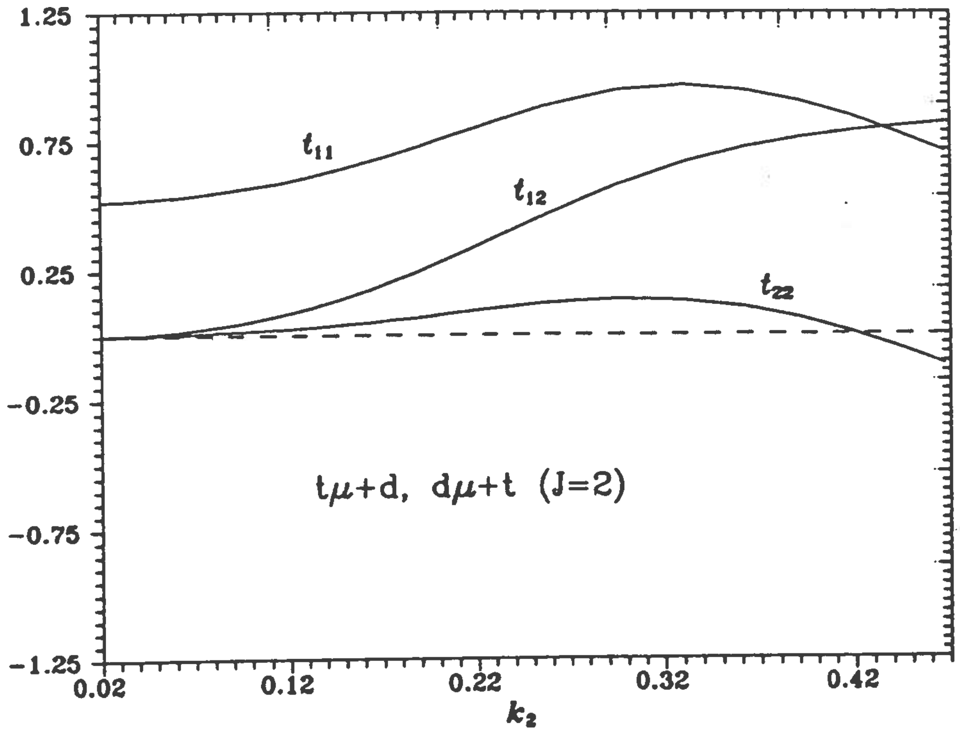

t_{11}
t_{12}
t_{22}
tμ+d, dμ+t (J=2)
1.25
0.75
0.25
−0.25
−0.75
−1.25
0.02
0.12
0.22
0.32
0.42
k_2

Fig. 14

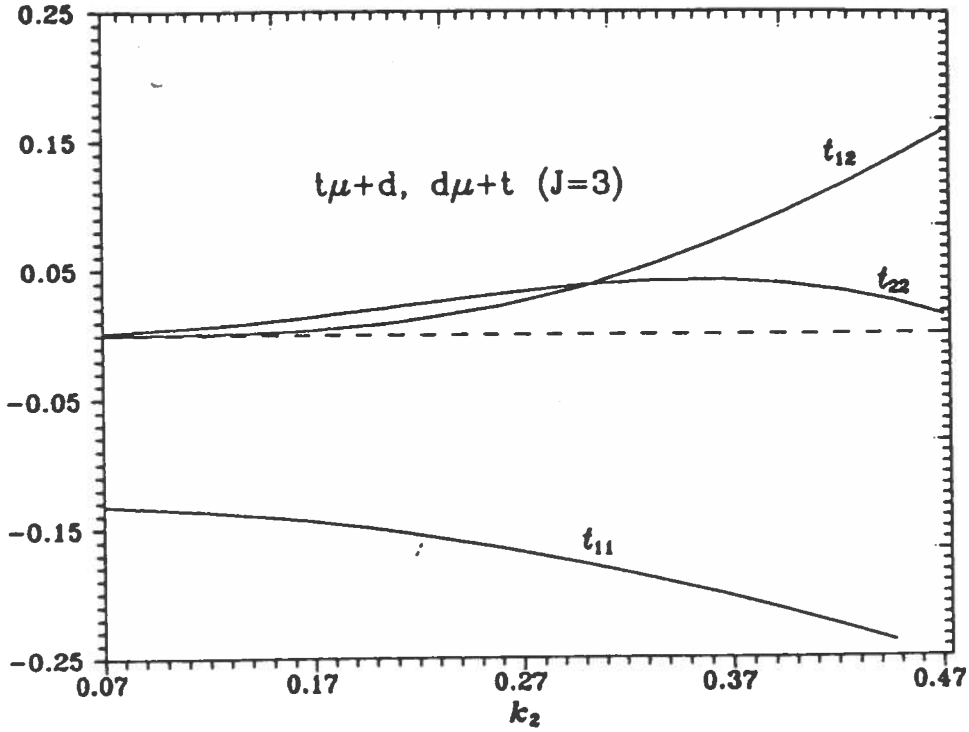

0.25
0.15
0.05
−0.05
−0.15
−0.25
0.07
0.17
0.27
0.37
0.47
k_2
tμ+d, dμ+t (J=3)
t_{12}
t_{22}
t_{11}

Fig. 15

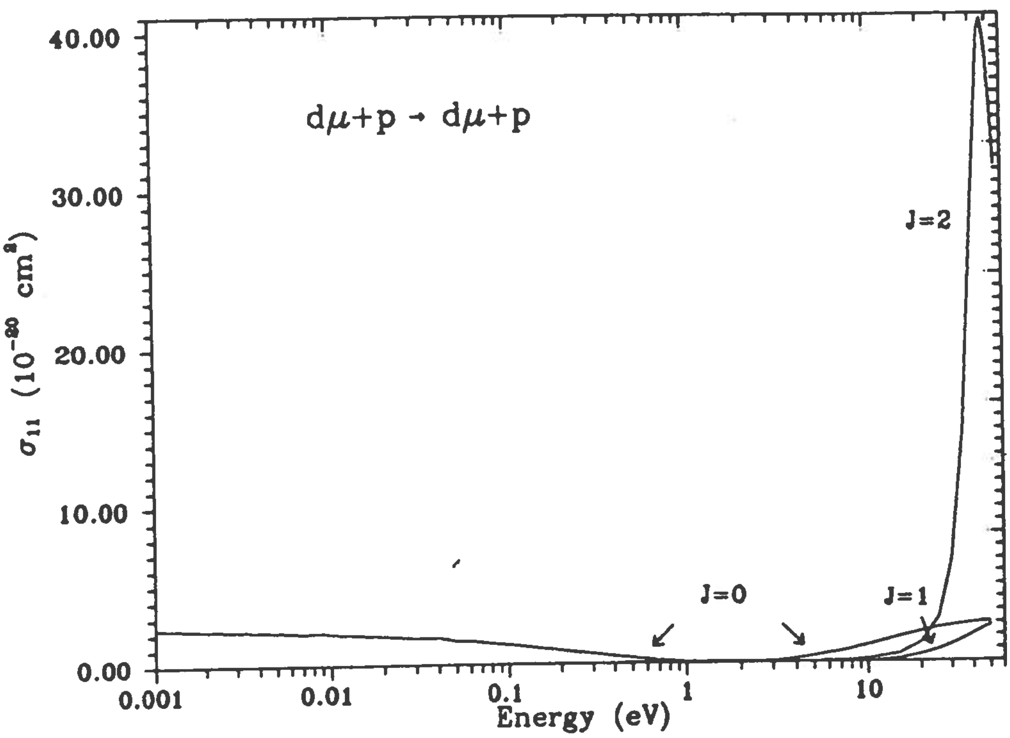
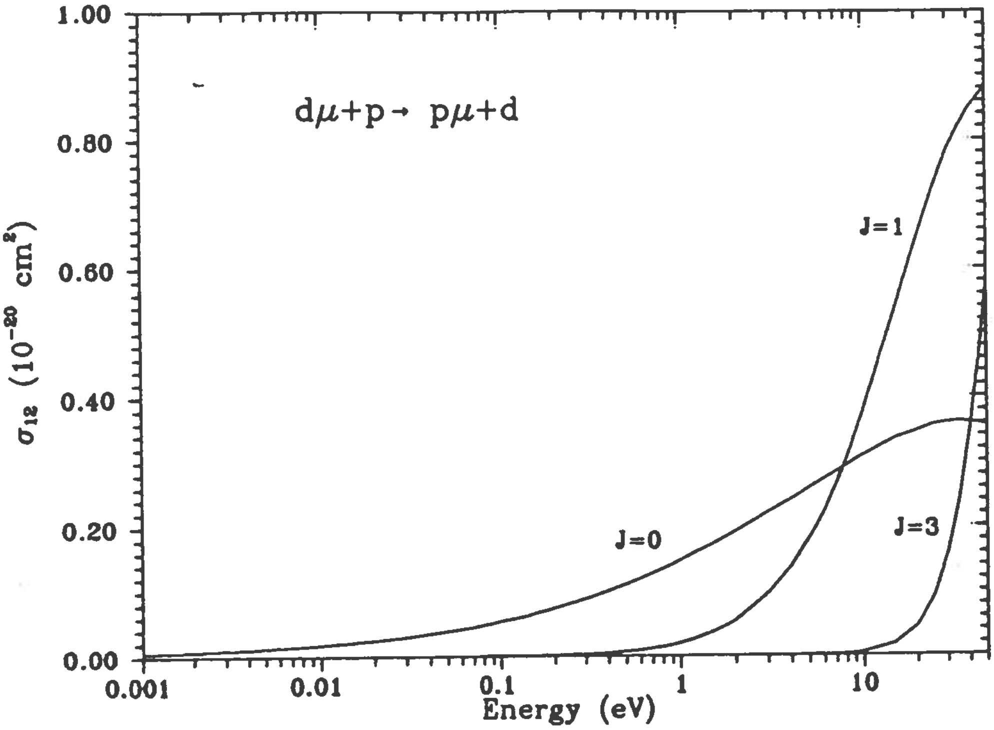
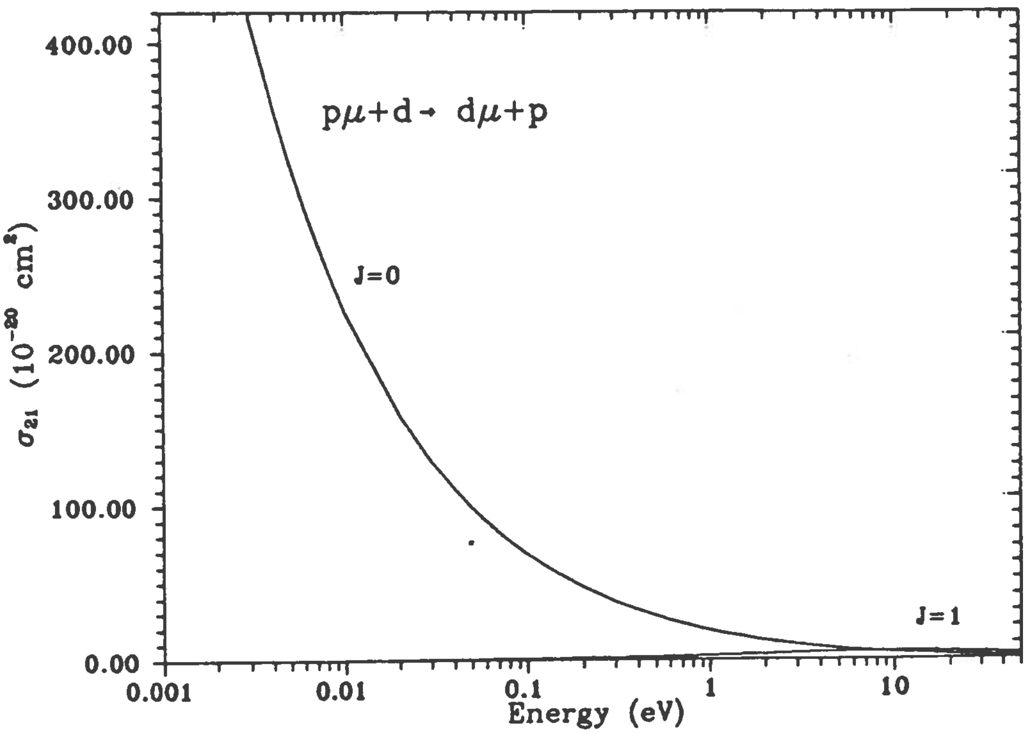

40.00
30.00
20.00
10.00
0.00
0.001
0.01
0.1
1
10
Energy (eV)
σ_{11} (10^{-20} cm^2)
dμ+p → dμ+p
J=2
J=0
J=1

Fig. 16



dμ+p→ pμ+d
J=1
J=0
J=3
σ12 (10^-20 cm^2)
1.00
0.80
0.60
0.40
0.20
0.00
0.001
0.01
0.1
1
10
Energy (eV)

Fig. 17



pμ+d→ dμ+p
J=0
J=1
σ21 (10^-20 cm^2)
400.00
300.00
200.00
100.00
0.00
0.001
0.01
0.1
1
10
Energy (eV)

Fig. 18

Table 7: *T*-matrix, $t\mu + p$, $p\mu + t$ ($J = 0$).

ε_2(eV)	k_2	t_{11}	$t_{12} = t_{21}$	t_{22}
0.001	0.1780E-02	-0.1685E+01	0.6297E-01	-0.4145E-02
0.002	0.2518E-02	-0.1685E+01	0.7486E-01	-0.5922E-02
0.003	0.3084E-02	-0.1686E+01	0.8284E-01	-0.7309E-02
0.004	0.3561E-02	-0.1686E+01	0.8900E-01	-0.8493E-02
0.005	0.3981E-02	-0.1686E+01	0.9409E-01	-0.9549E-02
0.006	0.4361E-02	-0.1686E+01	0.9846E-01	-0.1051E-01
0.007	0.4710E-02	-0.1686E+01	0.1023E+00	-0.1141E-01
0.008	0.5036E-02	-0.1686E+01	0.1058E+00	-0.1224E-01
0.009	0.5341E-02	-0.1686E+01	0.1090E+00	-0.1304E-01
0.010	0.5630E-02	-0.1686E+01	0.1118E+00	-0.1379E-01
0.020	0.7962E-02	-0.1689E+01	0.1330E+00	-0.2008E-01
0.030	0.9751E-02	-0.1690E+01	0.1470E+00	-0.2511E-01
0.040	0.1126E-01	-0.1690E+01	0.1578E+00	-0.2949E-01
0.050	0.1259E-01	-0.1691E+01	0.1667E+00	-0.3345E-01
0.060	0.1379E-01	-0.1692E+01	0.1743E+00	-0.3711E-01
0.070	0.1490E-01	-0.1692E+01	0.1810E+00	-0.4054E-01
0.080	0.1592E-01	-0.1693E+01	0.1870E+00	-0.4380E-01
0.090	0.1689E-01	-0.1694E+01	0.1925E+00	-0.4690E-01
0.100	0.1780E-01	-0.1694E+01	0.1975E+00	-0.4987E-01
0.120	0.1950E-01	-0.1695E+01	0.2065E+00	-0.5552E-01
0.140	0.2107E-01	-0.1697E+01	0.2144E+00	-0.6083E-01
0.160	0.2252E-01	-0.1698E+01	0.2214E+00	-0.6588E-01
0.180	0.2389E-01	-0.1699E+01	0.2278E+00	-0.7070E-01
0.200	0.2518E-01	-0.1700E+01	0.2337E+00	-0.7534E-01
0.300	0.3084E-01	-0.1706E+01	0.2578E+00	-0.9644E-01
0.400	0.3561E-01	-0.1711E+01	0.2765E+00	-0.1151E+00
0.500	0.3981E-01	-0.1717E+01	0.2921E+00	-0.1322E+00
0.600	0.4361E-01	-0.1722E+01	0.3056E+00	-0.1481E+00
0.700	0.4710E-01	-0.1728E+01	0.3176E+00	-0.1629E+00
0.800	0.5036E-01	-0.1733E+01	0.3284E+00	-0.1770E+00
0.900	0.5341E-01	-0.1738E+01	0.3385E+00	-0.1904E+00
1.000	0.5630E-01	-0.1743E+01	0.3478E+00	-0.2032E+00
1.200	0.6167E-01	-0.1754E+01	0.3647E+00	-0.2275E+00
1.400	0.6661E-01	-0.1764E+01	0.3801E+00	-0.2502E+00
1.600	0.7121E-01	-0.1774E+01	0.3941E+00	-0.2718E+00
1.800	0.7553E-01	-0.1785E+01	0.4072E+00	-0.2925E+00
2.000	0.7962E-01	-0.1795E+01	0.4195E+00	-0.3124E+00
3.000	0.9751E-01	-0.1846E+01	0.4744E+00	-0.4048E+00
4.000	0.1126E+00	-0.1895E+01	0.5223E+00	-0.4895E+00
5.000	0.1259E+00	-0.1947E+01	0.5699E+00	-0.5703E+00

Table 7: (continue) T-matrix, $t\mu + p$, $p\mu + t$ ($J = 0$).

ε_2(eV)	- k_2	t_{11}	$t_{12} = t_{21}$	t_{22}
6.000	0.1379E+00	-0.2000E+01	0.6169E+00	-0.6493E+00
7.000	0.1490E+00	-0.2055E+01	0.6646E+00	-0.7280E+00
8.000	0.1592E+00	-0.2113E+01	0.7141E+00	-0.8073E+00
9.000	0.1689E+00	-0.2175E+01	0.7663E+00	-0.8884E+00
10.000	0.1780E+00	-0.2240E+01	0.8219E+00	-0.9719E+00
15.000	0.2180E+00	-0.2639E+01	0.1174E+01	-0.1458E+01
20.000	0.2518E+00	-0.3241E+01	0.1740E+01	-0.2165E+01
25.000	0.2815E+00	-0.4330E+01	0.2830E+01	-0.3433E+01
30.000	0.3084E+00	-0.7193E+01	0.5844E+01	-0.6792E+01
35.000	0.3331E+00	-0.4719E+02	0.4922E+02	-0.5402E+02
40.000	0.3561E+00	0.6722E+01	-0.9496E+01	0.9718E+01
45.000	0.3777E+00	0.2275E+01	-0.4776E+01	0.4505E+01
50.000	0.3981E+00	0.8897E+00	-0.3395E+01	0.2922E+01

Table 8: T-matrix, $t\mu + p$, $p\mu + t$ ($J = 1$).

ε_2(eV)	k_2	t_{11}	$t_{12} = t_{21}$	t_{22}
0.010	0.5630E-02	-0.8346E+00	0.2068E-02	0.2060E-03
0.020	0.7962E-02	-0.8345E+00	0.3477E-02	0.4063E-03
0.030	0.9751E-02	-0.8344E+00	0.4713E-02	0.6027E-03
0.040	0.1126E-01	-0.8343E+00	0.5848E-02	0.7958E-03
0.050	0.1259E-01	-0.8342E+00	0.6913E-02	0.9862E-03
0.060	0.1379E-01	-0.8341E+00	0.7925E-02	0.1174E-02
0.070	0.1490E-01	-0.8340E+00	0.8895E-02	0.1359E-02
0.080	0.1592E-01	-0.8340E+00	0.9831E-02	0.1542E-02
0.090	0.1689E-01	-0.8339E+00	0.1074E-01	0.1723E-02
0.100	0.1780E-01	-0.8338E+00	0.1162E-01	0.1902E-02
0.120	0.1950E-01	-0.8336E+00	0.1332E-01	0.2254E-02
0.140	0.2107E-01	-0.8334E+00	0.1495E-01	0.2598E-02
0.160	0.2252E-01	-0.8333E+00	0.1652E-01	0.2936E-02
0.180	0.2389E-01	-0.8331E+00	0.1804E-01	0.3266E-02
0.200	0.2518E-01	-0.8329E+00	0.1952E-01	0.3590E-02
0.300	0.3084E-01	-0.8321E+00	0.2640E-01	0.5118E-02
0.400	0.3561E-01	-0.8312E+00	0.3269E-01	0.6508E-02
0.500	0.3981E-01	-0.8304E+00	0.3855E-01	0.7774E-02
0.600	0.4361E-01	-0.8296E+00	0.4410E-01	0.8927E-02
0.700	0.4710E-01	-0.8289E+00	0.4939E-01	0.9979E-02
0.800	0.5036E-01	-0.8281E+00	0.5445E-01	0.1094E-01
0.900	0.5341E-01	-0.8274E+00	0.5933E-01	0.1181E-01
1.000	0.5630E-01	-0.8266E+00	0.6404E-01	0.1260E-01
1.200	0.6167E-01	-0.8253E+00	0.7303E-01	0.1396E-01
1.400	0.6661E-01	-0.8239E+00	0.8155E-01	0.1506E-01
1.600	0.7121E-01	-0.8227E+00	0.8965E-01	0.1593E-01
1.800	0.7553E-01	-0.8215E+00	0.9740E-01	0.1659E-01
2.000	0.7962E-01	-0.8204E+00	0.1048E+00	0.1706E-01
3.000	0.9751E-01	-0.8158E+00	0.1383E+00	0.1700E-01
4.000	0.1126E+00	-0.8126E+00	0.1671E+00	0.1376E-01
5.000	0.1259E+00	-0.8107E+00	0.1924E+00	0.8193E-02
6.000	0.1379E+00	-0.8100E+00	0.2151E+00	0.7880E-03
7.000	0.1490E+00	-0.8103E+00	0.2357E+00	-0.8144E-02
8.000	0.1592E+00	-0.8115E+00	0.2545E+00	-0.1836E-01
9.000	0.1689E+00	-0.8135E+00	0.2719E+00	-0.2963E-01
10.000	0.1780E+00	-0.8163E+00	0.2880E+00	-0.4172E-01
15.000	0.2180E+00	-0.8391E+00	0.3564E+00	-0.1099E+00
20.000	0.2518E+00	-0.8731E+00	0.4130E+00	-0.1854E+00
25.000	0.2815E+00	-0.9156E+00	0.4646E+00	-0.2645E+00
30.000	0.3084E+00	-0.9656E+00	0.5150E+00	-0.3464E+00
35.000	0.3331E+00	-0.1023E+01	0.5668E+00	-0.4312E+00
40.000	0.3561E+00	-0.1086E+01	0.6213E+00	-0.5197E+00
45.000	0.3777E+00	-0.1157E+01	0.6806E+00	-0.6131E+00
50.000	0.3981E+00	-0.1235E+01	0.7454E+00	-0.7118E+00

Table 9: T-matrix, $t\mu + p$, $p\mu + t$ ($J = 2$).

ε_2(eV)	k_2	t_{11}	$t_{12} = t_{21}$	t_{22}
0.100	0.1780E-01	-0.1296E+01	0.1505E-03	0.3069E-03
0.200	0.2518E-01	-0.1296E+01	0.3589E-03	0.6205E-03
0.300	0.3084E-01	-0.1297E+01	0.5970E-03	0.9386E-03
0.400	0.3561E-01	-0.1298E+01	0.8566E-03	0.1259E-02
0.500	0.3981E-01	-0.1298E+01	0.1134E-02	0.1580E-02
0.600	0.4361E-01	-0.1299E+01	0.1426E-02	0.1901E-02
0.700	0.4710E-01	-0.1300E+01	0.1730E-02	0.2222E-02
0.800	0.5036E-01	-0.1300E+01	0.2045E-02	0.2542E-02
0.900	0.5341E-01	-0.1301E+01	0.2371E-02	0.2863E-02
1.000	0.5630E-01	-0.1301E+01	0.2705E-02	0.3184E-02
1.200	0.6167E-01	-0.1303E+01	0.3398E-02	0.3826E-02
1.400	0.6661E-01	-0.1304E+01	0.4120E-02	0.4469E-02
1.600	0.7121E-01	-0.1305E+01	0.4866E-02	0.5111E-02
1.800	0.7553E-01	-0.1306E+01	0.5633E-02	0.5750E-02
2.000	0.7962E-01	-0.1308E+01	0.6421E-02	0.6386E-02
3.000	0.9751E-01	-0.1314E+01	0.1060E-01	0.9518E-02
4.000	0.1126E+00	-0.1320E+01	0.1510E-01	0.1257E-01
5.000	0.1259E+00	-0.1327E+01	0.1985E-01	0.1556E-01
6.000	0.1379E+00	-0.1333E+01	0.2480E-01	0.1858E-01
7.000	0.1490E+00	-0.1339E+01	0.2991E-01	0.2154E-01
8.000	0.1592E+00	-0.1345E+01	0.3514E-01	0.2431E-01
9.000	0.1689E+00	-0.1351E+01	0.4046E-01	0.2692E-01
10.000	0.1780E+00	-0.1357E+01	0.4586E-01	0.2941E-01
15.000	0.2180E+00	-0.1385E+01	0.7340E-01	0.3857E-01
20.000	0.2518E+00	-0.1416E+01	0.1012E+00	0.4238E-01
25.000	0.2815E+00	-0.1449E+01	0.1286E+00	0.4078E-01
30.000	0.3084E+00	-0.1481E+01	0.1553E+00	0.3518E-01
35.000	0.3331E+00	-0.1514E+01	0.1811E+00	0.2527E-01
40.000	0.3561E+00	-0.1549E+01	0.2063E+00	0.1278E-01
45.000	0.3777E+00	-0.1586E+01	0.2308E+00	-0.2895E-02
50.000	0.3981E+00	-0.1626E+01	0.2551E+00	-0.2080E-01

Table 10: T-matrix, $t\mu + p$, $p\mu + t$ $(J = 3)$.

ε_2(eV)	k_2	t_{11}	$t_{12} = t_{21}$	t_{22}
1.000	0.5630E-01	0.1386E+01	0.5326E-03	0.1025E-02
1.200	0.6167E-01	0.1393E+01	0.7315E-03	0.1231E-02
1.400	0.6661E-01	0.1399E+01	0.9568E-03	0.1435E-02
1.600	0.7121E-01	0.1406E+01	0.1207E-02	0.1638E-02
1.800	0.7553E-01	0.1412E+01	0.1484E-02	0.1841E-02
2.000	0.7962E-01	0.1419E+01	0.1783E-02	0.2043E-02
3.000	0.9751E-01	0.1453E+01	0.3634E-02	0.3075E-02
4.000	0.1126E+00	0.1487E+01	0.6038E-02	0.4152E-02
5.000	0.1259E+00	0.1523E+01	0.8963E-02	0.5253E-02
6.000	0.1379E+00	0.1559E+01	0.1239E-01	0.6393E-02
7.000	0.1490E+00	0.1597E+01	0.1628E-01	0.7613E-02
8.000	0.1592E+00	0.1636E+01	0.2063E-01	0.8929E-02
9.000	0.1689E+00	0.1676E+01	0.2543E-01	0.1032E-01
10.000	0.1780E+00	0.1717E+01	0.3069E-01	0.1176E-01
15.000	0.2180E+00	0.1941E+01	0.6372E-01	0.1981E-01
20.000	0.2518E+00	0.2203E+01	0.1081E+00	0.2872E-01
25.000	0.2815E+00	0.2515E+01	0.1646E+00	0.3901E-01
30.000	0.3084E+00	0.2885E+01	0.2345E+00	0.5031E-01
35.000	0.3331E+00	0.3326E+01	0.3196E+00	0.6395E-01
40.000	0.3561E+00	0.3851E+01	0.4222E+00	0.7945E-01
45.000	0.3777E+00	0.4484E+01	0.5468E+00	0.9895E-01
50.000	0.3981E+00	0.5264E+01	0.6989E+00	0.1225E+00

Table 11: T-matrix, $t\mu + d$.

ε_1(eV)	k_1	$J=0$	$J=1$	$J=2$	$J=3$
0.001	0.2033E-02	-0.7139E-02			
0.002	0.2875E-02	-0.1021E-01			
0.003	0.3521E-02	-0.1261E-01			
0.004	0.4066E-02	-0.1466E-01			
0.005	0.4546E-02	-0.1649E-01			
0.006	0.4980E-02	-0.1816E-01			
0.007	0.5379E-02	-0.1970E-01			
0.008	0.5751E-02	-0.2116E-01			
0.009	0.6099E-02	-0.2253E-01			
0.010	0.6429E-02	-0.2384E-01	-0.2763E-03		
0.020	0.9092E-02	-0.3470E-01	-0.1093E-02		
0.030	0.1114E-01	-0.4338E-01	-0.2215E-02		
0.040	0.1286E-01	-0.5090E-01	-0.3567E-02		
0.050	0.1438E-01	-0.5769E-01	-0.5091E-02		
0.060	0.1575E-01	-0.6395E-01	-0.6752E-02		
0.070	0.1701E-01	-0.6980E-01	-0.8522E-02		
0.080	0.1818E-01	-0.7532E-01	-0.1038E-01		
0.090	0.1929E-01	-0.8057E-01	-0.1232E-01		
0.100	0.2033E-01	-0.8560E-01	-0.1431E-01	0.6118E-03	
0.120	0.2227E-01	-0.9510E-01	-0.1845E-01	0.7331E-03	
0.140	0.2406E-01	-0.1040E+00	-0.2272E-01	0.8540E-03	
0.160	0.2572E-01	-0.1124E+00	-0.2708E-01	0.9807E-03	
0.180	0.2728E-01	-0.1204E+00	-0.3151E-01	0.1102E-02	
0.200	0.2875E-01	-0.1281E+00	-0.3596E-01	0.1228E-02	
0.300	0.3521E-01	-0.1627E+00	-0.5819E-01	0.1846E-02	
0.400	0.4066E-01	-0.1930E+00	-0.7966E-01	0.2468E-02	
0.500	0.4546E-01	-0.2206E+00	-0.1000E+00	0.3092E-02	
0.600	0.4980E-01	-0.2462E+00	-0.1193E+00	0.3718E-02	
0.700	0.5379E-01	-0.2703E+00	-0.1375E+00	0.4349E-02	
0.800	0.5751E-01	-0.2932E+00	-0.1548E+00	0.4979E-02	
0.900	0.6099E-01	-0.3151E+00	-0.1712E+00	0.5611E-02	
1.000	0.6429E-01	-0.3363E+00	-0.1869E+00	0.6245E-02	0.2062E-02
1.200	0.7043E-01	-0.3766E+00	-0.2164E+00	0.7520E-02	0.2470E-02
1.400	0.7607E-01	-0.4150E+00	-0.2437E+00	0.8802E-02	0.2874E-02
1.600	0.8132E-01	-0.4519E+00	-0.2693E+00	0.1009E-01	0.3276E-02
1.800	0.8626E-01	-0.4877E+00	-0.2935E+00	0.1139E-01	0.3678E-02
2.000	0.9092E-01	-0.5225E+00	-0.3165E+00	0.1269E-01	0.4084E-02
3.000	0.1114E+00	-0.6891E+00	-0.4187E+00	0.1927E-01	0.6236E-02
4.000	0.1286E+00	-0.8528E+00	-0.5080E+00	0.2613E-01	0.8636E-02
5.000	0.1438E+00	-0.1022E+01	-0.5903E+00	0.3306E-01	0.1119E-01

Table 11: (continue) T-matrix, $t\mu + d$.

ε_1(eV)	k_1	$J = 0$	$J = 1$	$J = 2$	$J = 3$
6.000	0.1575E+00	-0.1202E+01	-0.6684E+00	0.4020E-01	0.1386E-01
7.000	0.1701E+00	-0.1399E+01	-0.7443E+00	0.4747E-01	0.1674E-01
8.000	0.1818E+00	-0.1621E+01	-0.8193E+00	0.5486E-01	0.1992E-01
9.000	0.1929E+00	-0.1875E+01	-0.8942E+00	0.6243E-01	0.2346E-01
10.000	0.2033E+00	-0.2175E+01	-0.9697E+00	0.7002E-01	0.2747E-01
15.000	0.2490E+00	-0.5499E+01	-0.1377E+01	0.1100E+00	0.6342E-01
20.000	0.2875E+00	0.4517E+02	-0.1886E+01	0.1531E+00	0.2761E+00
21.000	0.2946E+00				0.5407E+00
22.000	0.3016E+00				0.3562E+01
22.100	0.3022E+00				0.7435E+01
22.200	0.3029E+00				-0.1016E+03
22.300	0.3036E+00				-0.6565E+01
22.400	0.3043E+00				-0.3413E+01
22.500	0.3050E+00				-0.2316E+01
22.600	0.3056E+00				-0.1758E+01
22.700	0.3063E+00				-0.1421E+01
22.800	0.3070E+00				-0.1194E+01
22.900	0.3077E+00				-0.1032E+01
23.000	0.3083E+00				-0.9101E+00
24.000	0.3150E+00				-0.4341E+00
25.000	0.3215E+00	0.5119E+01	-0.2602E+01	0.2000E+00	-0.2988E+00
30.000	0.3521E+00	0.2812E+01	-0.3749E+01	0.2515E+00	-0.1500E+00
35.000	0.3804E+00	0.1951E+01	-0.6006E+01	0.3084E+00	-0.1272E+00
40.000	0.4066E+00	0.1485E+01	-0.1275E+02	0.3728E+00	-0.1255E+00
45.000	0.4313E+00	0.1185E+01	0.1198E+04	0.4473E+00	-0.1310E+00

Table 12: T-matrix, $t\mu + d$, $d\mu + t$ $(J = 0)$.

ε_2(eV)	k_2	t_{11}	$t_{12} = t_{21}$	t_{22}
0.001	0.2088E-02	0.1082E+01	-0.1175E-01	-0.2636E-02
0.002	0.2953E-02	0.1082E+01	-0.1395E-01	-0.3856E-02
0.003	0.3617E-02	0.1081E+01	-0.1544E-01	-0.4841E-02
0.004	0.4177E-02	0.1081E+01	-0.1658E-01	-0.5705E-02
0.005	0.4670E-02	0.1081E+01	-0.1753E-01	-0.6490E-02
0.006	0.5115E-02	0.1081E+01	-0.1834E-01	-0.7219E-02
0.007	0.5525E-02	0.1081E+01	-0.1906E-01	-0.7906E-02
0.008	0.5907E-02	0.1081E+01	-0.1970E-01	-0.8559E-02
0.009	0.6265E-02	0.1081E+01	-0.2028E-01	-0.9184E-02
0.010	0.6604E-02	0.1081E+01	-0.2081E-01	-0.9786E-02
0.020	0.9340E-02	0.1081E+01	-0.2468E-01	-0.1502E-01
0.030	0.1144E-01	0.1080E+01	-0.2724E-01	-0.1946E-01
0.040	0.1321E-01	0.1080E+01	-0.2921E-01	-0.2348E-01
0.050	0.1477E-01	0.1079E+01	-0.3081E-01	-0.2722E-01
0.060	0.1618E-01	0.1079E+01	-0.3219E-01	-0.3075E-01
0.070	0.1747E-01	0.1078E+01	-0.3339E-01	-0.3413E-01
0.080	0.1868E-01	0.1078E+01	-0.3447E-01	-0.3738E-01
0.090	0.1981E-01	0.1078E+01	-0.3543E-01	-0.4052E-01
0.100	0.2088E-01	0.1077E+01	-0.3632E-01	-0.4356E-01
0.120	0.2288E-01	0.1076E+01	-0.3791E-01	-0.4941E-01
0.140	0.2471E-01	0.1075E+01	-0.3929E-01	-0.5499E-01
0.160	0.2642E-01	0.1074E+01	-0.4052E-01	-0.6035E-01
0.180	0.2802E-01	0.1073E+01	-0.4162E-01	-0.6553E-01
0.200	0.2953E-01	0.1073E+01	-0.4263E-01	-0.7054E-01
0.300	0.3617E-01	0.1068E+01	-0.4672E-01	-0.9369E-01
0.400	0.4177E-01	0.1064E+01	-0.4978E-01	-0.1145E+00
0.500	0.4670E-01	0.1059E+01	-0.5226E-01	-0.1338E+00
0.600	0.5115E-01	0.1055E+01	-0.5434E-01	-0.1519E+00
0.700	0.5525E-01	0.1051E+01	-0.5615E-01	-0.1690E+00
0.800	0.5907E-01	0.1046E+01	-0.5775E-01	-0.1854E+00
0.900	0.6265E-01	0.1042E+01	-0.5919E-01	-0.2012E+00
1.000	0.6604E-01	0.1038E+01	-0.6050E-01	-0.2165E+00
1.200	0.7234E-01	0.1029E+01	-0.6283E-01	-0.2457E+00
1.400	0.7814E-01	0.1021E+01	-0.6489E-01	-0.2735E+00
1.600	0.8354E-01	0.1013E+01	-0.6674E-01	-0.3001E+00
1.800	0.8860E-01	0.1004E+01	-0.6845E-01	-0.3257E+00
2.000	0.9340E-01	0.9963E+00	-0.7005E-01	-0.3506E+00
3.000	0.1144E+00	0.9573E+00	-0.7709E-01	-0.4670E+00
4.000	0.1321E+00	0.9202E+00	-0.8341E-01	-0.5765E+00
5.000	0.1477E+00	0.8850E+00	-0.8948E-01	-0.6833E+00

Table 28: Cross sections $\sigma_{21}(cm^2)$ $d\mu + t \rightarrow t\mu + d$.

ε_2(eV)	$J = 0$	$J = 1$	$J = 2$	$J = 3$
0.001	0.1352E-18			
0.002	0.9551E-19			
0.003	0.7792E-19			
0.004	0.6742E-19			
0.005	0.6026E-19			
0.006	0.5497E-19			
0.007	0.5086E-19			
0.008	0.4754E-19			
0.009	0.4479E-19			
0.010	0.4247E-19	0.1134E-20		
0.020	0.2986E-19	0.1602E-20		
0.030	0.2426E-19	0.1960E-20		
0.040	0.2092E-19	0.2261E-20		
0.050	0.1864E-19	0.2526E-20		
0.060	0.1695E-19	0.2755E-20		
0.070	0.1563E-19	0.2973E-20		
0.080	0.1458E-19	0.3175E-20		
0.090	0.1370E-19	0.3364E-20		
0.100	0.1296E-19	0.3542E-20	0.9936E-22	
0.120	0.1176E-19	0.3871E-20	0.1308E-21	
0.140	0.1083E-19	0.4171E-20	0.1647E-21	
0.160	0.1008E-19	0.4448E-20	0.2012E-21	
0.180	0.9457E-20	0.4706E-20	0.2400E-21	
0.200	0.8932E-20	0.4947E-20	0.2809E-21	
0.300	0.7150E-20	0.5977E-20	0.5150E-21	
0.400	0.6088E-20	0.6803E-20	0.7911E-21	
0.500	0.5364E-20	0.7494E-20	0.1103E-20	
0.600	0.4829E-20	0.8086E-20	0.1446E-20	
0.700	0.4414E-20	0.8599E-20	0.1817E-20	
0.800	0.4079E-20	0.9048E-20	0.2213E-20	
0.900	0.3801E-20	0.9440E-20	0.2633E-20	
1.000	0.3567E-20	0.9775E-20	0.3074E-20	0.2049E-24
1.200	0.3192E-20	0.1046E-19		0.3298E-24
1.400	0.2901E-20	0.1095E-19		0.4973E-24
1.600	0.2669E-20	0.1135E-19		0.7146E-24
1.800	0.2479E-20	0.1168E-19		0.9889E-24
2.000	0.2319E-20	0.1194E-19	0.8397E-20	0.1327E-23
3.000	0.1792E-20	0.1260E-19	0.1477E-19	0.4210E-23
4.000	0.1491E-20	0.1273E-19	0.2165E-19	0.9696E-23
5.000	0.1290E-20	0.1255E-19	0.2859E-19	0.1860E-22

Table 28: (continue) Cross sections $\sigma_{21}(\mathrm{cm}^2)$ $d\mu + t \rightarrow t\mu + d$.

ε_2(eV)	$J=0$	$J=1$	$J=2$	$J=3$
6.000	0.1145E-20	0.1226E-19	0.3527E-19	0.3172E-22
7.000	0.1034E-20	0.1190E-19	0.4152E-19	0.4994E-22
8.000	0.9470E-21	0.1150E-19	0.4713E-19	0.7393E-22
9.000	0.8755E-21	0.1109E-19	0.5209E-19	0.1044E-21
10.000	0.8155E-21	0.1071E-19	0.5628E-19	0.1418E-21
15.000	0.6218E-21	0.8940E-20	0.6768E-19	0.4481E-21
20.000	0.5135E-21	0.7566E-20	0.6846E-19	0.9672E-21
25.000	0.4428E-21	0.6492E-20	0.6473E-19	0.1684E-20
27.000	0.4205E-21			
28.000	0.4106E-21			
29.000	0.4012E-21			
30.000	0.3925E-21	0.5649E-20	0.5971E-19	0.2560E-20
35.000	0.3540E-21	0.4961E-20	0.5459E-19	0.3545E-20
40.000	0.3233E-21	0.4407E-20	0.4988E-19	0.4576E-20
45.000	0.2991E-21	0.3945E-20	0.4563E-19	0.5630E-20
50.000	0.2795E-21	0.3552E-20	0.4195E-19	0.6658E-20

Table 29: Cross sections $\sigma_{22}(\mathrm{cm}^2)$ $d\mu + t \rightarrow d\mu + t$.

ε_2(eV)	$J = 0$	$J = 1$	$J = 2$	$J = 3$
0.001	0.1558E-19			
0.002	0.1663E-19			
0.003	0.1746E-19			
0.004	0.1816E-19			
0.005	0.1878E-19			
0.006	0.1935E-19			
0.007	0.1988E-19			
0.008	0.2037E-19			
0.009	0.2084E-19			
0.010	0.2129E-19	0.1221E-21		
0.020	0.2496E-19	0.2341E-21		
0.030	0.2786E-19	0.3389E-21		
0.040	0.3036E-19	0.4376E-21		
0.050	0.3259E-19	0.5308E-21		
0.060	0.3462E-19	0.6345E-21		
0.070	0.3650E-19	0.7149E-21		
0.080	0.3826E-19	0.7913E-21		
0.090	0.3991E-19	0.8636E-21		
0.100	0.4148E-19	0.9318E-21	0.4569E-22	
0.120	0.4439E-19	0.1045E-20	0.5573E-22	
0.140	0.4705E-19	0.1155E-20	0.6527E-22	
0.160	0.4951E-19	0.1252E-20	0.7485E-22	
0.180	0.5180E-19	0.1337E-20	0.8430E-22	
0.200	0.5395E-19	0.1410E-20	0.9370E-22	
0.300	0.6302E-19	0.1666E-20	0.1411E-21	
0.400	0.7020E-19	0.1795E-20	0.1886E-21	
0.500	0.7615E-19	0.1831E-20	0.2362E-21	
0.600	0.8124E-19	0.1812E-20	0.2839E-21	
0.700	0.8570E-19	0.1749E-20	0.3318E-21	
0.800	0.8966E-19	0.1657E-20	0.3798E-21	
0.900	0.9322E-19	0.1552E-20	0.4278E-21	
1.000	0.9646E-19	0.1444E-20	0.4759E-21	0.7170E-22
1.200	0.1021E-18	0.1103E-20		0.8602E-22
1.400	0.1069E-18	0.8180E-21		0.1003E-21
1.600	0.1109E-18	0.5631E-21		0.1147E-21
1.800	0.1144E-18	0.3519E-21		0.1290E-21
2.000	0.1174E-18	0.1931E-21	0.9512E-21	0.1434E-21
3.000	0.1277E-18	0.3464E-21	0.1411E-20	0.2168E-21
4.000	0.1331E-18	0.2057E-20	0.1865E-20	0.2897E-21
5.000	0.1357E-18	0.5029E-20	0.2315E-20	0.3636E-21

Table 29: (continue) Cross sections $\sigma_{22}(\text{cm}^2)$ $d\mu + t \rightarrow d\mu + t$.

ε_2(eV)	$J = 0$	$J = 1$	$J = 2$	$J = 3$
6.000	0.1364E-18	0.8909E-20	0.2765E-20	0.4310E-21
7.000	0.1359E-18	0.1339E-19	0.3225E-20	0.5098E-21
8.000	0.1346E-18	0.1824E-19	0.3701E-20	0.5875E-21
9.000	0.1326E-18	0.2328E-19	0.4210E-20	0.6578E-21
10.000	0.1302E-18	0.2839E-19	0.4752E-20	0.7269E-21
15.000	0.1151E-18	0.5233E-19	0.8166E-20	0.9721E-21
20.000	0.9878E-19	0.7119E-19	0.1252E-19	0.1075E-20
25.000	0.8353E-19	0.8461E-19	0.1730E-19	0.1031E-20
27.000	0.7789E-19			
28.000	0.7517E-19			
29.000	0.7252E-19			
30.000	0.6995E-19	0.9352E-19	0.2198E-19	0.8938E-21
35.000	0.5815E-19	0.9858E-19	0.2636E-19	0.7103E-21
40.000	0.4802E-19	0.1009E-18	0.3034E-19	0.5189E-21
45.000	0.3942E-19	0.1011E-18	0.3376E-19	0.3620E-21
50.000	0.3216E-19	0.9953E-19	0.3671E-19	0.2652E-21

Table 30.a: Total cross sections $\sigma_{11}(cm^2)$: $t\mu + d \rightarrow t\mu + d$, below $d\mu - t$ threshold.

ε_1(eV)	σ_{11}
0.001	0.1098E-18
0.002	0.1122E-18
0.003	0.1141E-18
0.004	0.1157E-18
0.005	0.1171E-18
0.006	0.1183E-18
0.007	0.1194E-18
0.008	0.1205E-18
0.009	0.1214E-18
0.010	0.1224E-18
0.020	0.1299E-18
0.030	0.1359E-18
0.040	0.1413E-18
0.050	0.1463E-18
0.060	0.1511E-18
0.070	0.1559E-18
0.080	0.1606E-18
0.090	0.1653E-18
0.100	0.1700E-18
0.120	0.1793E-18
0.140	0.1885E-18
0.160	0.1977E-18
0.180	0.2067E-18
0.200	0.2156E-18
0.300	0.2579E-18
0.400	0.2954E-18
0.500	0.3281E-18
0.600	0.3566E-18
0.700	0.3811E-18
0.800	0.4025E-18
0.900	0.4211E-18
1.000	0.4375E-18
1.200	0.4644E-18
1.400	0.4856E-18
1.600	0.5023E-18
1.800	0.5155E-18
2.000	0.5261E-18
3.000	0.5539E-18
4.000	0.5602E-18
5.000	0.5566E-18
6.000	0.5481E-18
7.000	0.5368E-18
8.000	0.5242E-18
9.000	0.5109E-18
10.000	0.4973E-18
15.000	0.4336E-18
20.000	0.4256E-18
21.000	0.5251E-18
22.000	0.9884E-18
22.100	0.1022E-17
22.200	0.1030E-17
22.300	0.1011E-17
22.400	0.9693E-18
22.500	0.9133E-18
22.600	0.8516E-18
22.700	0.7907E-18
22.800	0.7343E-18
22.900	0.6843E-18
23.000	0.6407E-18
24.000	0.4339E-18
25.000	0.3742E-18
30.000	0.2973E-18
35.000	0.2620E-18
40.000	0.2363E-18
45.000	0.2172E-18

Table 30.b: Total cross sections $\sigma_{ij}(\mathrm{cm}^2)$: $t\mu+d, d\mu+t$, above $d\mu-t$ threshold.

ε_2(eV)	σ_{11}	σ_{12}	σ_{21}	σ_{22}
0.001	0.2137E-18	0.2897E-23	0.1353E-18	0.1559E-19
0.002	0.2137E-18	0.4108E-23	0.9574E-19	0.1666E-19
0.003	0.2137E-18	0.5042E-23	0.7826E-19	0.1750E-19
0.004	0.2137E-18	0.5831E-23	0.6788E-19	0.1821E-19
0.005	0.2137E-18	0.6528E-23	0.6083E-19	0.1884E-19
0.006	0.2136E-18	0.7160E-23	0.5566E-19	0.1943E-19
0.007	0.2136E-18	0.7742E-23	0.5166E-19	0.1997E-19
0.008	0.2136E-18	0.8284E-23	0.4846E-19	0.2047E-19
0.009	0.2136E-18	0.8795E-23	0.4582E-19	0.2095E-19
0.010	0.2136E-18	0.9278E-23	0.4361E-19	0.2142E-19
0.020	0.2135E-18	0.1340E-22	0.3148E-19	0.2520E-19
0.030	0.2135E-18	0.1676E-22	0.2625E-19	0.2821E-19
0.040	0.2135E-18	0.1975E-22	0.2322E-19	0.3082E-19
0.050	0.2134E-18	0.2254E-22	0.2122E-19	0.3315E-19
0.060	0.2134E-18	0.2518E-22	0.1976E-19	0.3529E-19
0.070	0.2133E-18	0.2774E-22	0.1867E-19	0.3725E-19
0.080	0.2133E-18	0.3024E-22	0.1783E-19	0.3909E-19
0.090	0.2132E-18	0.3269E-22	0.1715E-19	0.4082E-19
0.100	0.2132E-18	0.3511E-22	0.1660E-19	0.4246E-19
0.120	0.2131E-18	0.3999E-22	0.1576E-19	0.4550E-19
0.140	0.2131E-18	0.4486E-22	0.1517E-19	0.4828E-19
0.160	0.2130E-18	0.4976E-22	0.1473E-19	0.5085E-19
0.180	0.2129E-18	0.5472E-22	0.1440E-19	0.5323E-19
0.200	0.2129E-18	0.5974E-22	0.1416E-19	0.5547E-19
0.300	0.2126E-18	0.8612E-22	0.1364E-19	0.6485E-19
0.400	0.2123E-18	0.1149E-21	0.1368E-19	0.7221E-19
0.500	0.2121E-18	0.1462E-21	0.1396E-19	0.7825E-19
0.600	0.2118E-18	0.1801E-21	0.1436E-19	0.8338E-19
0.700	0.2115E-18	0.2165E-21	0.1483E-19	0.8783E-19
0.800	0.2113E-18	0.2554E-21	0.1534E-19	0.9175E-19
0.900	0.2110E-18	0.2968E-21	0.1587E-19	0.9526E-19
1.000	0.2108E-18	0.3403E-21	0.1642E-19	0.9845E-19
1.200	0.2122E-18	0.4574E-21	0.1779E-19	0.1039E-18
1.400	0.2113E-18	0.5746E-21	0.1905E-19	0.1085E-18
1.600	0.2103E-18	0.6919E-21	0.2029E-19	0.1123E-18
1.800	0.2093E-18	0.8090E-21	0.2149E-19	0.1157E-18
2.000	0.2084E-18	0.9250E-21	0.2266E-19	0.1187E-18
3.000	0.2059E-18	0.1743E-20	0.2917E-19	0.1297E-18
4.000	0.2037E-18	0.2803E-20	0.3588E-19	0.1373E-18
5.000	0.2013E-18	0.4067E-20	0.4245E-19	0.1434E-18

Table 30.b: (continue) Total cross sections $\sigma_{ij}(\text{cm}^2)$: $t\mu + d, d\mu + t$, above $d\mu - t$ threshold.

ε_2(eV)	σ_{11}	σ_{12}	σ_{21}	σ_{22}
6.000	0.1988E-18	0.5503E-20	0.4871E-19	0.1485E-18
7.000	0.1961E-18	0.7048E-20	0.5450E-19	0.1530E-18
8.000	0.1934E-18	0.8664E-20	0.5965E-19	0.1571E-18
9.000	0.1904E-18	0.1030E-19	0.6416E-19	0.1607E-18
10.000	0.1873E-18	0.1191E-19	0.6795E-19	0.1641E-18
15.000	0.1704E-18	0.1881E-19	0.7769E-19	0.1766E-18
20.000	0.1530E-18	0.2314E-19	0.7751E-19	0.1836E-18
25.000	0.1372E-18	0.2551E-19	0.7335E-19	0.1865E-18
27.000	0.1240E-18	0.2596E-19	0.7133E-19	0.1862E-18
28.000	0.1237E-18	0.2618E-19	0.7032E-19	0.1862E-18
29.000	0.1234E-18	0.2640E-19	0.6932E-19	0.1862E-18
30.000	0.1232E-18	0.2663E-19	0.6831E-19	0.1863E-18
35.000	0.1111E-18	0.2712E-19	0.6345E-19	0.1838E-18
40.000	0.1006E-18	0.2729E-19	0.5919E-19	0.1798E-18
45.000	0.9146E-19	0.2725E-19	0.5550E-19	0.1746E-18
50.000	0.8351E-19	0.2712E-19	0.5244E-19	0.1687E-18

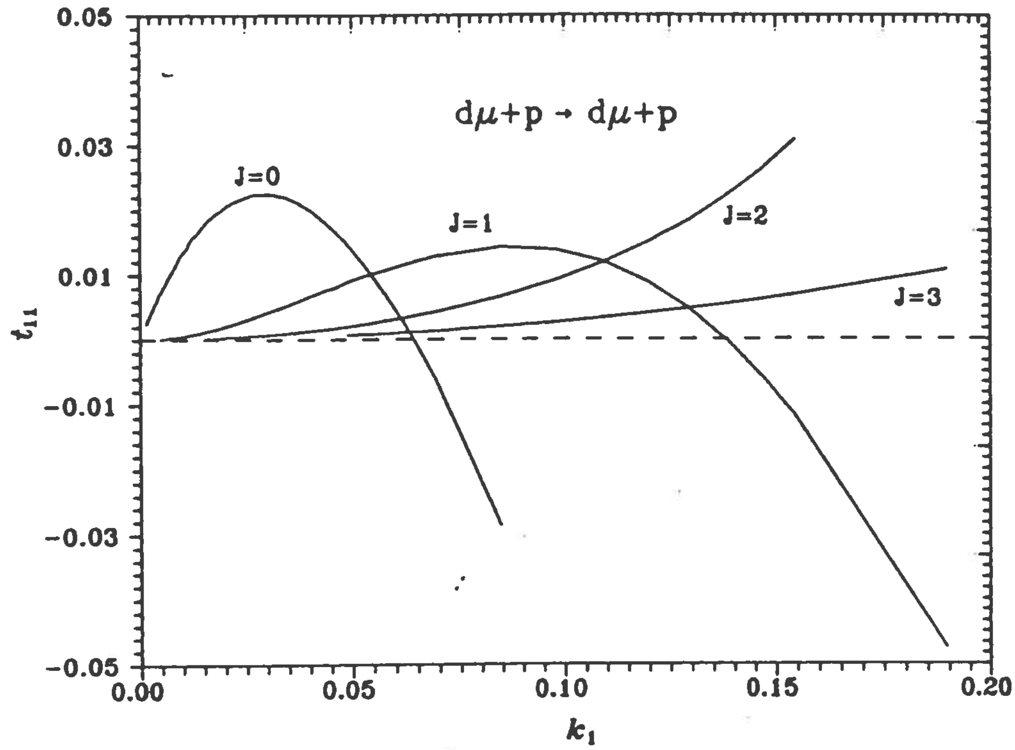

0.05
0.03
0.01
−0.01
−0.03
−0.05
0.00
0.05
0.10
0.15
0.20
t_{11}
k_1
dμ+p → dμ+p
J=0
J=1
J=2
J=3

Fig. 1

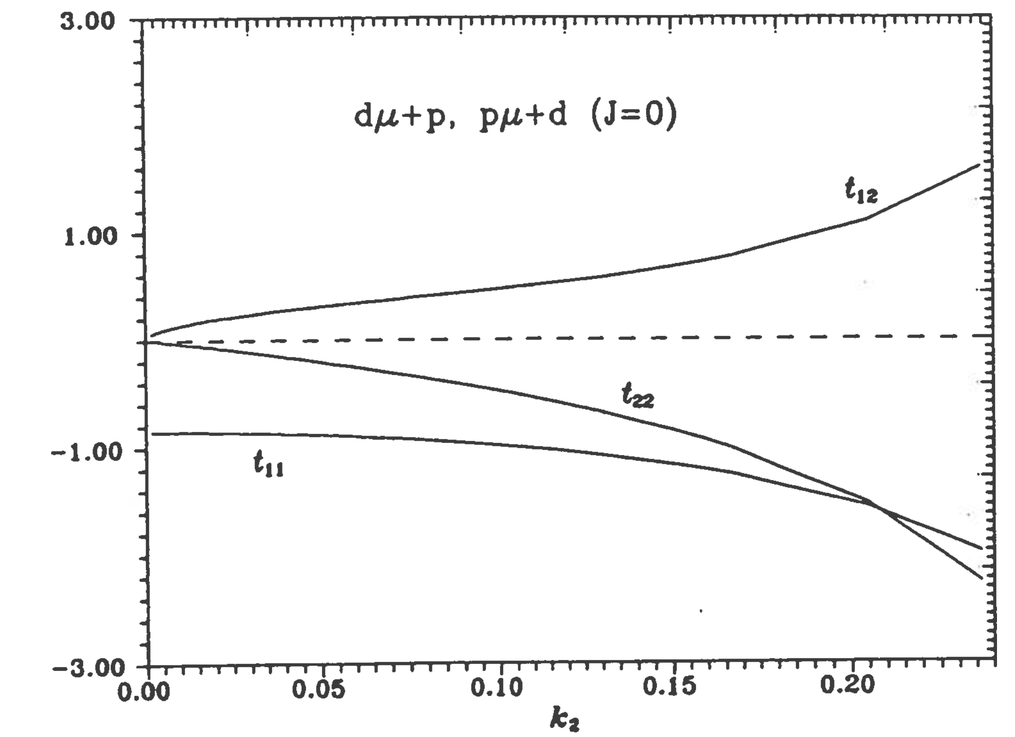

3.00
1.00
−1.00
−3.00
0.00
0.05
0.10
0.15
0.20
k_2
dμ+p, pμ+d (J=0)
t_{12}
t_{22}
t_{11}

Fig. 2

Table 12: (continue) T-matrix, $t\mu + d$, $d\mu + t$ $(J = 0)$.

ε_2(eV)	k_2	t_{11}	$t_{12} = t_{21}$	t_{22}
6.000	0.1618E+00	0.8515E+00	-0.9563E-01	-0.7904E+00
7.000	0.1747E+00	0.8195E+00	-0.1020E+00	-0.8999E+00
8.000	0.1868E+00	0.7890E+00	-0.1090E+00	-0.1014E+01
9.000	0.1981E+00	0.7597E+00	-0.1164E+00	-0.1134E+01
10.000	0.2088E+00	0.7314E+00	-0.1244E+00	-0.1261E+01
15.000	0.2558E+00	0.6027E+00	-0.1823E+00	-0.2109E+01
20.000	0.2953E+00	0.4879E+00	-0.3108E+00	-0.3835E+01
25.000	0.3302E+00	0.3540E+00	-0.8445E+00	-0.1069E+02
27.000	0.3432E+00	0.2035E+00	-0.2325E+01	-0.2951E+02
28.000	0.3495E+00	-0.8140E+00	-0.1503E+02	-0.1907E+03
29.000	0.3556E+00	0.6287E+00	0.3476E+01	0.4405E+02
30.000	0.3617E+00	0.4643E+00	0.1581E+01	0.1999E+02
35.000	0.3907E+00	0.3012E+00	0.4462E+00	0.5526E+01
40.000	0.4177E+00	0.2186E+00	0.2736E+00	0.3272E+01
45.000	0.4430E+00	0.1500E+00	0.2052E+00	0.2335E+01
50.000	0.4670E+00	0.8720E-01	0.1692E+00	0.1810E+01

Table 13: T-matrix, $t\mu + d$, $d\mu + t$ $(J = 1)$.

ε_2(eV)	k_2	t_{11}	$t_{12} = t_{21}$	t_{22}
0.010	0.6604E-02	0.3218E+02	0.4290E-01	0.4945E-03
0.020	0.9340E-02	0.3206E+02	0.7186E-01	0.1017E-02
0.030	0.1144E-01	0.3193E+02	0.9697E-01	0.1556E-02
0.040	0.1321E-01	0.3181E+02	0.1198E+00	0.2107E-02
0.050	0.1477E-01	0.3169E+02	0.1410E+00	0.2666E-02
0.060	0.1618E-01	0.3201E+02	0.1627E+00	0.3268E-02
0.070	0.1747E-01	0.3188E+02	0.1818E+00	0.3836E-02
0.080	0.1868E-01	0.3176E+02	0.2000E+00	0.4408E-02
0.090	0.1981E-01	0.3164E+02	0.2176E+00	0.4985E-02
0.100	0.2088E-01	0.3151E+02	0.2344E+00	0.5563E-02
0.120	0.2288E-01	0.3126E+02	0.2664E+00	0.6699E-02
0.140	0.2471E-01	0.3102E+02	0.2964E+00	0.7861E-02
0.160	0.2642E-01	0.3078E+02	0.3247E+00	0.9022E-02
0.180	0.2802E-01	0.3055E+02	0.3516E+00	0.1018E-01
0.200	0.2953E-01	0.3032E+02	0.3771E+00	0.1133E-01
0.300	0.3617E-01	0.2921E+02	0.4893E+00	0.1703E-01
0.400	0.4177E-01	0.2817E+02	0.5814E+00	0.2258E-01
0.500	0.4670E-01	0.2720E+02	0.6587E+00	0.2790E-01
0.600	0.5115E-01	0.2627E+02	0.7243E+00	0.3298E-01
0.700	0.5525E-01	0.2541E+02	0.7805E+00	0.3777E-01
0.800	0.5907E-01	0.2460E+02	0.8288E+00	0.4226E-01
0.900	0.6265E-01	0.2383E+02	0.8701E+00	0.4647E-01
1.000	0.6604E-01	0.2311E+02	0.9054E+00	0.5039E-01
1.200	0.7234E-01	0.2182E+02	0.9704E+00	0.5721E-01
1.400	0.7814E-01	0.2062E+02	0.1014E+01	0.6287E-01
1.600	0.8354E-01	0.1952E+02	0.1046E+01	0.6740E-01
1.800	0.8860E-01	0.1853E+02	0.1068E+01	0.7087E-01
2.000	0.9340E-01	0.1762E+02	0.1083E+01	0.7331E-01
3.000	0.1144E+00	0.1401E+02	0.1086E+01	0.7235E-01
4.000	0.1321E+00	0.1166E+02	0.1052E+01	0.5887E-01
5.000	0.1477E+00	0.9933E+01	0.9998E+00	0.3688E-01
6.000	0.1618E+00	0.8567E+01	0.9388E+00	0.9283E-02
7.000	0.1747E+00	0.7595E+01	0.8916E+00	-0.2011E-01
8.000	0.1868E+00	0.6813E+01	0.8470E+00	-0.5142E-01
9.000	0.1981E+00	0.6145E+01	0.8031E+00	-0.8425E-01
10.000	0.2088E+00	0.5605E+01	0.7663E+00	-0.1173E+00
15.000	0.2558E+00	0.3906E+01	0.6382E+00	-0.2850E+00
20.000	0.2953E+00	0.2995E+01	0.5681E+00	-0.4550E+00
25.000	0.3302E+00	0.2425E+01	0.5313E+00	-0.6316E+00
30.000	0.3617E+00	0.2032E+01	0.5171E+00	-0.8231E+00
35.000	0.3907E+00	0.1740E+01	0.5193E+00	-0.1037E+01
40.000	0.4177E+00	0.1512E+01	0.5380E+00	-0.1287E+01
45.000	0.4430E+00	0.1324E+01	0.5735E+00	-0.1590E+01
50.000	0.4670E+00	0.1163E+01	0.6288E+00	-0.1972E+01

Table 14: T-matrix, $t\mu + d$, $d\mu + t$ $(J = 2)$.

ε_2(eV)	k_2	t_{11}	$t_{12} = t_{21}$	t_{22}
0.100	0.2088E-01	0.5211E+00	0.1087E-02	0.6541E-03
0.120	0.2288E-01	0.5213E+00	0.1367E-02	0.7915E-03
0.140	0.2471E-01	0.5217E+00	0.1657E-02	0.9254E-03
0.160	0.2642E-01	0.5221E+00	0.1958E-02	0.1060E-02
0.180	0.2802E-01	0.5225E+00	0.2268E-02	0.1193E-02
0.200	0.2953E-01	0.5229E+00	0.2587E-02	0.1326E-02
0.300	0.3617E-01	0.5250E+00	0.4293E-02	0.1997E-02
0.400	0.4177E-01	0.5272E+00	0.6149E-02	0.2671E-02
0.500	0.4670E-01	0.5294E+00	0.8124E-02	0.3350E-02
0.600	0.5115E-01	0.5317E+00	0.1020E-01	0.4033E-02
0.700	0.5525E-01	0.5340E+00	0.1236E-01	0.4722E-02
0.800	0.5907E-01	0.5363E+00	0.1460E-01	0.5417E-02
0.900	0.6265E-01	0.5386E+00	0.1691E-01	0.6116E-02
1.000	0.6604E-01	0.5409E+00	0.1928E-01	0.6821E-02
2.000	0.9340E-01	0.5645E+00	0.4555E-01	0.1415E-01
3.000	0.1144E+00	0.5895E+00	0.7501E-01	0.2200E-01
4.000	0.1321E+00	0.6163E+00	0.1066E+00	0.3040E-01
5.000	0.1477E+00	0.6429E+00	0.1393E+00	0.3924E-01
6.000	0.1618E+00	0.6709E+00	0.1729E+00	0.4837E-01
7.000	0.1747E+00	0.6980E+00	0.2069E+00	0.5762E-01
8.000	0.1868E+00	0.7254E+00	0.2409E+00	0.6684E-01
9.000	0.1981E+00	0.7520E+00	0.2747E+00	0.7594E-01
10.000	0.2088E+00	0.7774E+00	0.3078E+00	0.8467E-01
15.000	0.2558E+00	0.8851E+00	0.4602E+00	0.1204E+00
20.000	0.2953E+00	0.9460E+00	0.5798E+00	0.1358E+00
25.000	0.3302E+00	0.9638E+00	0.6662E+00	0.1290E+00
30.000	0.3617E+00	0.9440E+00	0.7237E+00	0.1019E+00
35.000	0.3907E+00	0.9021E+00	0.7623E+00	0.6047E-01
40.000	0.4177E+00	0.8447E+00	0.7884E+00	0.7667E-02
45.000	0.4430E+00	0.7782E+00	0.8063E+00	-0.5323E-01
50.000	0.4670E+00	0.7079E+00	0.8212E+00	-0.1196E+00

Table 15: *T*-matrix, $t\mu + d$, $d\mu + t$ ($J = 3$).

ε_2(eV)	k_2	t_{11}	$t_{12} = t_{21}$	t_{22}
1.000	0.6604E-01	-0.1326E+00	0.1180E-03	0.2188E-02
1.200	0.7234E-01	-0.1330E+00	0.1640E-03	0.2625E-02
1.400	0.7814E-01	-0.1334E+00	0.2175E-03	0.3063E-02
1.600	0.8354E-01	-0.1338E+00	0.2788E-03	0.3500E-02
1.800	0.8860E-01	-0.1343E+00	0.3479E-03	0.3938E-02
2.000	0.9340E-01	-0.1347E+00	0.4249E-03	0.4377E-02
3.000	0.1144E+00	-0.1372E+00	0.9271E-03	0.6590E-02
4.000	0.1321E+00	-0.1393E+00	0.1625E-02	0.8797E-02
5.000	0.1477E+00	-0.1415E+00	0.2518E-02	0.1102E-01
6.000	0.1618E+00	-0.1435E+00	0.3607E-02	0.1314E-01
7.000	0.1747E+00	-0.1458E+00	0.4890E-02	0.1544E-01
8.000	0.1868E+00	-0.1481E+00	0.6363E-02	0.1771E-01
9.000	0.1981E+00	-0.1505E+00	0.8023E-02	0.1988E-01
10.000	0.2088E+00	-0.1528E+00	0.9856E-02	0.2202E-01
15.000	0.2558E+00	-0.1651E+00	0.2151E-01	0.3116E-01
20.000	0.2953E+00	-0.1772E+00	0.3659E-01	0.3771E-01
25.000	0.3302E+00	-0.1893E+00	0.5418E-01	0.4101E-01
30.000	0.3617E+00	-0.2012E+00	0.7347E-01	0.4121E-01
35.000	0.3907E+00	-0.2135E+00	0.9390E-01	0.3845E-01
40.000	0.4177E+00	-0.2258E+00	0.1148E+00	0.3274E-01
45.000	0.4430E+00	-0.2378E+00	0.1360E+00	0.2448E-01
50.000	0.4670E+00	-0.2508E+00	0.1573E+00	0.1382E-01

Table 16: Cross sections $\sigma_{11}(cm^2)$ $d\mu + p \rightarrow d\mu + p$.

ε_1(eV)	$J = 0$	$J = 1$	$J = 2$	$J = 3$
0.001	0.2371E-19			
0.002	0.2219E-19			
0.003	0.2182E-19			
0.004	0.2138E-19			
0.005	0.2101E-19			
0.006	0.2083E-19			
0.007	0.2030E-19			
0.008	0.2087E-19			
0.009	0.2082E-19			
0.010	0.1998E-19	0.2143E-22		
0.020	0.1823E-19	0.4228E-22		
0.030	0.1682E-19	0.6124E-22		
0.040	0.1673E-19	0.8067E-22		
0.050	0.1495E-19	0.9877E-22		
0.060	0.1495E-19	0.1172E-21		
0.070	0.1406E-19	0.1350E-21		
0.080	0.1335E-19	0.1521E-21		
0.090	0.1281E-19	0.1690E-21		
0.100	0.1242E-19	0.1853E-21	0.7776E-23	
0.120	0.1148E-19	0.2176E-21	0.9306E-23	
0.140	0.1059E-19	0.2468E-21	0.1085E-22	
0.160	0.9884E-20	0.2793E-21	0.1242E-22	
0.180	0.9286E-20	0.3072E-21	0.1397E-22	
0.200	0.8703E-20	0.3356E-21	0.1554E-22	
0.300	0.6449E-20	0.4589E-21	0.2342E-22	
0.400	0.4849E-20	0.5620E-21	0.3113E-22	
0.500	0.3701E-20	0.6446E-21	0.3965E-22	
0.600	0.2813E-20	0.7195E-21	0.4796E-22	
0.700	0.2112E-20	0.7738E-21	0.5585E-22	
0.800	0.1582E-20	0.8307E-21	0.6433E-22	
0.900	0.1164E-20	0.8525E-21	0.7166E-22	
1.000	0.8331E-21	0.9069E-21	0.8046E-22	0.1205E-22
1.200	0.3814E-21	0.9443E-21	0.9848E-22	0.1453E-22
1.400	0.1288E-21	0.9529E-21	0.1168E-21	0.1683E-22
1.600	0.1650E-22	0.9669E-21	0.1338E-21	0.1914E-22
1.800	0.6306E-23	0.9631E-21	0.1541E-21	0.2182E-22
2.000	0.7234E-22	0.9512E-21	0.1718E-21	0.2403E-22
3.000	0.1054E-20	0.7883E-21	0.2791E-21	0.3666E-22
4.000	0.2505E-20	0.5561E-21	0.4034E-21	0.4794E-22
5.000	0.4065E-20	0.3286E-21	0.5507E-21	0.6096E-22

Table 16: (continue) Cross sections $\sigma_{11}(\mathrm{cm}^2)$ $d\mu + p \rightarrow d\mu + p$.

ε_1(eV)	$J=0$	$J=1$	$J=2$	$J=3$
134.889	0.1176E-19	0.2895E-19		
134.909	0.1174E-19	0.2894E-19	0.8311E-19	
135.009	0.1164E-19	0.2887E-19	0.8308E-19	
135.109	0.1157E-19	0.2881E-19	0.8304E-19	
135.209	0.1151E-19	0.2874E-19	0.8301E-19	
135.309	0.1145E-19	0.2868E-19	0.8298E-19	
135.409	0.1141E-19	0.2861E-19	0.8295E-19	
135.509	0.1137E-19	0.2854E-19	0.8291E-19	
135.609	0.1133E-19	0.2847E-19	0.8288E-19	
135.709	0.1130E-19	0.2840E-19	0.8285E-19	0.2579E-19
135.909	0.1124E-19	0.2827E-19	0.8279E-19	0.2594E-19
136.109	0.1119E-19	0.2814E-19	0.8273E-19	0.2609E-19
136.309	0.1115E-19	0.2801E-19	0.8266E-19	0.2624E-19
136.509	0.1111E-19	0.2788E-19	0.8260E-19	0.2640E-19
136.709	0.1108E-19	0.2774E-19	0.8254E-19	0.2655E-19
137.709	0.1096E-19	0.2713E-19	0.8223E-19	0.2733E-19
138.709	0.1088E-19	0.2658E-19	0.8194E-19	0.2812E-19
139.709	0.1081E-19	0.2609E-19	0.8165E-19	0.2894E-19
140.709	0.1076E-19	0.2565E-19	0.8136E-19	0.2977E-19
141.709	0.1071E-19	0.2527E-19	0.8108E-19	0.3063E-19
142.709	0.1067E-19	0.2493E-19	0.8081E-19	0.3151E-19
143.709	0.1064E-19	0.2464E-19	0.8053E-19	0.3241E-19
144.709	0.1060E-19	0.2438E-19	0.8026E-19	0.3334E-19
149.709	0.1047E-19	0.2352E-19	0.7893E-19	0.3835E-19
154.709	0.1031E-19	0.2311E-19	0.7766E-19	0.4394E-19
159.709	0.1031E-19	0.2291E-19	0.7650E-19	0.4989E-19
164.709	0.1021E-19	0.2285E-19	0.7545E-19	0.5597E-19
169.709	0.1007E-19	0.2285E-19	0.7446E-19	0.6203E-19
174.709	0.9972E-20	0.2289E-19	0.7348E-19	0.6790E-19
179.709	0.9838E-20	0.2291E-19	0.7249E-19	0.7332E-19
184.709	0.9706E-20	0.2291E-19	0.7154E-19	0.7800E-19

Table 16: (continue) Cross sections $\sigma_{11}(\text{cm}^2)$ $d\mu + p \rightarrow d\mu + p$.

ε_1(eV)	$J = 0$	$J = 1$	$J = 2$	$J = 3$
6.000	0.5605E-20	0.1480E-21	0.7289E-21	0.7373E-22
7.000	0.7082E-20	0.3556E-22	0.9328E-21	0.8661E-22
8.000	0.8461E-20	0.9056E-25	0.1189E-20	0.1002E-21
9.000	0.9751E-20	0.4303E-22	0.1487E-20	0.1141E-21
10.000	0.1095E-19	0.1617E-21	0.1843E-20	0.1288E-21
15.000	0.1572E-19	0.1739E-20	0.4911E-20	0.2083E-21
20.000	0.1902E-19	0.4404E-20	0.1182E-19	0.3015E-21
25.000	0.2130E-19	0.7591E-20	0.2771E-19	0.4043E-21
30.000	0.2279E-19	0.1094E-19	0.6404E-19	0.5244E-21
35.000	0.2381E-19	0.1423E-19	0.1443E-18	0.6592E-21
40.000	0.2448E-19	0.1737E-19	0.2845E-18	0.8169E-21
45.000	0.2480E-19	0.2026E-19	0.3994E-18	0.1004E-20
47.000			0.4072E-18	
49.000			0.3951E-18	
50.000	0.2480E-19	0.2289E-19	0.3842E-18	0.1219E-20
51.000			0.3712E-18	
53.000			0.3426E-18	
55.000			0.3138E-18	
134.710	0.1224E-19			
134.711	0.1222E-19			
134.712	0.1221E-19			
134.713	0.1219E-19			
134.714	0.1218E-19			
134.715	0.1217E-19			
134.716	0.1216E-19			
134.717	0.1216E-19			
134.718	0.1215E-19			
134.719	0.1214E-19	0.2905E-19		
134.729	0.1209E-19	0.2904E-19		
134.739	0.1204E-19	0.2903E-19		
134.749	0.1201E-19	0.2903E-19		
134.759	0.1198E-19	0.2902E-19		
134.769	0.1196E-19	0.2902E-19		
134.779	0.1193E-19	0.2901E-19		
134.789	0.1191E-19	0.2900E-19		
134.799	0.1189E-19	0.2900E-19		
134.809	0.1187E-19	0.2899E-19	0.8314E-19	
134.829	0.1184E-19	0.2899E-19		
134.849	0.1181E-19	0.2898E-19		
134.869	0.1178E-19	0.2896E-19		

Table 17: Cross sections $\sigma_{12}(\mathrm{cm}^2)$ $d\mu + p \rightarrow p\mu + d$.

ε_1(eV)	$J=0$	$J=1$	$J=2$	$J=3$
134.710	0.5709E-22			
134.711	0.8058E-22			
134.712	0.9854E-22			
134.713	0.1136E-21			
134.714	0.1269E-21			
134.715	0.1388E-21			
134.716	0.1498E-21			
134.717	0.1600E-21			
134.718	0.1695E-21			
134.719	0.1785E-21	0.2045E-24		
134.729	0.2506E-21	0.5788E-24		
134.739	0.3051E-21	0.1064E-23		
134.749	0.3504E-21	0.1638E-23		
134.759	0.3899E-21	0.2290E-23		
134.769	0.4253E-21	0.3011E-23		
134.779	0.4575E-21	0.3795E-23		
134.789	0.4872E-21	0.4637E-23		
134.799	0.5149E-21	0.5534E-23		
134.809	0.5409E-21	0.6483E-23	0.7664E-30	
134.829	0.5888E-21	0.8522E-23		
134.849	0.6322E-21	0.1074E-22		
134.869	0.6720E-21	0.1312E-22		
134.889	0.7091E-21	0.1566E-22		
134.909	0.7437E-21	0.1834E-22	0.5103E-29	
135.009	0.8913E-21	0.3369E-22	0.1620E-28	
135.109	0.1011E-20	0.5182E-22	0.3764E-28	
135.209	0.1112E-20	0.7230E-22	0.7332E-28	
135.309	0.1201E-20	0.9486E-22	0.1273E-27	
135.409	0.1281E-20	0.1193E-21	0.2038E-27	
135.509	0.1354E-20	0.1453E-21	0.3070E-27	
135.609	0.1420E-20	0.1729E-21	0.4407E-27	
135.709	0.1481E-20	0.2020E-21	0.6086E-27	0.1937E-25
135.909	0.1592E-20	0.2637E-21	0.1060E-26	0.3613E-25
136.109	0.1690E-20	0.3299E-21	0.1684E-26	0.6109E-25
136.309	0.1777E-20	0.3998E-21	0.2492E-26	0.9617E-25
136.509	0.1857E-20	0.4730E-21	0.3490E-26	0.1434E-24
136.709	0.1929E-20	0.5491E-21	0.4673E-26	0.2048E-24
137.709	0.2217E-20	0.9568E-21	0.1267E-25	0.8048E-24
138.709	0.2429E-20	0.1386E-20	0.2109E-25	0.2123E-23
139.709	0.2596E-20	0.1819E-20	0.2583E-25	0.4515E-23

Table 24: (continue) Cross sections $\sigma_{22}(\mathrm{cm}^2)$ $p\mu + t \rightarrow p\mu + t$.

ε_2(eV)	$J=0$	$J=1$	$J=2$	$J=3$
6.000	0.9893E-19	0.2101E-20	0.9918E-21	0.1559E-21
7.000	0.9982E-19	0.1992E-20	0.1151E-20	0.1876E-21
8.000	0.1002E-18	0.1976E-20	0.1293E-20	0.2233E-21
9.000	0.1002E-18	0.2063E-20	0.1423E-20	0.2617E-21
10.000	0.9983E-19	0.2255E-20	0.1543E-20	0.3013E-21
15.000	0.9535E-19	0.4502E-20	0.1878E-20	0.5142E-21
20.000	0.8894E-19	0.8080E-20	0.1854E-20	0.6933E-21
25.000	0.8204E-19	0.1210E-19	0.1571E-20	0.8314E-21
30.000	0.7523E-19	0.1611E-19	0.1208E-20	0.8797E-21
35.000	0.6870E-19	0.1986E-19	0.8074E-21	0.8878E-21
40.000	0.6254E-19	0.2326E-19	0.4849E-21	0.8161E-21
45.000	0.5678E-19	0.2627E-19	0.2433E-21	0.7353E-21
50.000	0.5146E-19	0.2886E-19	0.1247E-21	0.6218E-21

Table 25.b: Total cross sections $\sigma_{ij}(cm^2)$: $t\mu+p, p\mu+t$, above $p\mu-t$ threshold.

ε_2(eV)	σ_{11}	σ_{12}	σ_{21}	σ_{22}
0.001	0.1928E-18	0.1979E-22	0.3470E-17	0.2254E-19
0.002	0.1928E-18	0.2795E-22	0.2451E-17	0.2322E-19
0.003	0.1928E-18	0.3420E-22	0.1999E-17	0.2374E-19
0.004	0.1928E-18	0.3946E-22	0.1730E-17	0.2418E-19
0.005	0.1928E-18	0.4409E-22	0.1546E-17	0.2457E-19
0.006	0.1928E-18	0.4826E-22	0.1411E-17	0.2493E-19
0.007	0.1928E-18	0.5210E-22	0.1306E-17	0.2525E-19
0.008	0.1928E-18	0.5566E-22	0.1221E-17	0.2557E-19
0.009	0.1928E-18	0.5901E-22	0.1150E-17	0.2585E-19
0.010	0.1928E-18	0.6216E-22	0.1091E-17	0.2613E-19
0.020	0.1927E-18	0.8766E-22	0.7689E-18	0.2838E-19
0.030	0.1927E-18	0.1071E-21	0.6261E-18	0.3014E-19
0.040	0.1927E-18	0.1235E-21	0.5410E-18	0.3165E-19
0.050	0.1927E-18	0.1379E-21	0.4830E-18	0.3300E-19
0.060	0.1926E-18	0.1508E-21	0.4404E-18	0.3423E-19
0.070	0.1926E-18	0.1628E-21	0.4071E-18	0.3538E-19
0.080	0.1926E-18	0.1739E-21	0.3805E-18	0.3645E-19
0.090	0.1926E-18	0.1844E-21	0.3584E-18	0.3747E-19
0.100	0.1926E-18	0.1943E-21	0.3397E-18	0.3843E-19
0.120	0.1925E-18	0.2128E-21	0.3099E-18	0.4023E-19
0.140	0.1925E-18	0.2299E-21	0.2867E-18	0.4189E-19
0.160	0.1924E-18	0.2459E-21	0.2681E-18	0.4344E-19
0.180	0.1924E-18	0.2609E-21	0.2527E-18	0.4490E-19
0.200	0.1924E-18	0.2753E-21	0.2398E-18	0.4627E-19
0.300	0.1923E-18	0.3397E-21	0.1967E-18	0.5224E-19
0.400	0.1921E-18	0.3962E-21	0.1716E-18	0.5708E-19
0.500	0.1920E-18	0.4481E-21	0.1550E-18	0.6115E-19
0.600	0.1919E-18	0.4972E-21	0.1430E-18	0.6461E-19
0.700	0.1918E-18	0.5442E-21	0.1339E-18	0.6760E-19
0.800	0.1917E-18	0.5897E-21	0.1268E-18	0.7021E-19
0.900	0.1916E-18	0.6341E-21	0.1211E-18	0.7249E-19
1.000	0.1915E-18	0.6777E-21	0.1164E-18	0.7453E-19
1.200	0.1915E-18	0.7626E-21	0.1090E-18	0.7799E-19
1.400	0.1915E-18	0.8457E-21	0.1036E-18	0.8083E-19
1.600	0.1915E-18	0.9271E-21	0.9940E-19	0.8323E-19
1.800	0.1915E-18	0.1007E-20	0.9607E-19	0.8530E-19
2.000	0.1915E-18	0.1087E-20	0.9336E-19	0.8715E-19
3.000	0.1916E-18	0.1474E-20	0.8495E-19	0.9395E-19
4.000	0.1918E-18	0.1852E-20	0.8024E-19	0.9818E-19
5.000	0.1919E-18	0.2221E-20	0.7728E-19	0.1006E-18

Table 25.b: (continue) Total cross sections $\sigma_{ij}(\mathrm{cm}^2)$: $t\mu + p, p\mu + t$, above $p\mu - t$ threshold.

ε_2(eV)	σ_{11}	σ_{12}	σ_{21}	σ_{22}
6.000	0.1921E-18	0.2574E-20	0.7499E-19	0.1022E-18
7.000	0.1923E-18	0.2911E-20	0.7306E-19	0.1032E-18
8.000	0.1925E-18	0.3230E-20	0.7137E-19	0.1037E-18
9.000	0.1927E-18	0.3535E-20	0.6984E-19	0.1039E-18
10.000	0.1929E-18	0.3828E-20	0.6842E-19	0.1039E-18
15.000	0.1937E-18	0.5129E-20	0.6262E-19	0.1022E-18
20.000	0.1940E-18	0.6216E-20	0.5838E-19	0.9957E-19
25.000	0.1937E-18	0.7166E-20	0.5524E-19	0.9654E-19
30.000	0.1928E-18	0.8029E-20	0.5284E-19	0.9343E-19
35.000	0.1913E-18	0.8812E-20	0.5092E-19	0.9026E-19
40.000	0.1892E-18	0.9524E-20	0.4928E-19	0.8710E-19
45.000	0.1868E-18	0.1016E-19	0.4785E-19	0.8403E-19
50.000	0.1841E-18	0.1073E-19	0.4649E-19	0.8107E-19

Table 26: Cross sections $\sigma_{11}(cm^2)$ $t\mu + d \to t\mu + d$.

ε_1(eV)	$J = 0$	$J = 1$	$J = 2$	$J = 3$
0.001	0.1098E-18			
0.002	0.1122E-18			
0.003	0.1141E-18			
0.004	0.1157E-18			
0.005	0.1171E-18			
0.006	0.1183E-18			
0.007	0.1194E-18			
0.008	0.1205E-18			
0.009	0.1214E-18			
0.010	0.1223E-18	0.4933E-22		
0.020	0.1295E-18	0.3858E-21		
0.030	0.1348E-18	0.1056E-20		
0.040	0.1392E-18	0.2055E-20		
0.050	0.1429E-18	0.3349E-20		
0.060	0.1462E-18	0.4909E-20		
0.070	0.1492E-18	0.6704E-20		
0.080	0.1519E-18	0.8706E-20		
0.090	0.1544E-18	0.1089E-19		
0.100	0.1567E-18	0.1323E-19	0.4041E-22	
0.120	0.1609E-18	0.1832E-19	0.4835E-22	
0.140	0.1646E-18	0.2381E-19	0.5624E-22	
0.160	0.1680E-18	0.2960E-19	0.6489E-22	
0.180	0.1710E-18	0.3560E-19	0.7279E-22	
0.200	0.1738E-18	0.4173E-19	0.8140E-22	
0.300	0.1851E-18	0.7269E-19	0.1226E-21	
0.400	0.1934E-18	0.1018E-18	0.1643E-21	
0.500	0.1999E-18	0.1280E-18	0.2063E-21	
0.600	0.2052E-18	0.1511E-18	0.2488E-21	
0.700	0.2095E-18	0.1713E-18	0.2917E-21	
0.800	0.2131E-18	0.1890E-18	0.3345E-21	
0.900	0.2162E-18	0.2045E-18	0.3776E-21	
1.000	0.2188E-18	0.2182E-18	0.4210E-21	0.6408E-22
1.200	0.2230E-18	0.2408E-18	0.5087E-21	0.7665E-22
1.400	0.2261E-18	0.2588E-18	0.5973E-21	0.8897E-22
1.600	0.2283E-18	0.2732E-18	0.6869E-21	0.1011E-21
1.800	0.2299E-18	0.2847E-18	0.7775E-21	0.1133E-21
2.000	0.2309E-18	0.2942E-18	0.8690E-21	0.1257E-21
3.000	0.2312E-18	0.3212E-18	0.1336E-20	0.1954E-21
4.000	0.2267E-18	0.3314E-18	0.1842E-20	0.2811E-21
5.000	0.2200E-18	0.3339E-18	0.2357E-20	0.3773E-21

Table 26: (continue) Cross sections $\sigma_{11}(\text{cm}^2)$ $t\mu + d \rightarrow t\mu + d$.

ε_1(eV)	$J=0$	$J=1$	$J=2$	$J=3$
6.000	0.2121E-18	0.3326E-18	0.2903E-20	0.4828E-21
7.000	0.2036E-18	0.3291E-18	0.3468E-20	0.6037E-21
8.000	0.1950E-18	0.3244E-18	0.4050E-20	0.7475E-21
9.000	0.1863E-18	0.3190E-18	0.4657E-20	0.9217E-21
10.000	0.1778E-18	0.3131E-18	0.5267E-20	0.1136E-20
15.000	0.1390E-18	0.2820E-18	0.8600E-20	0.4026E-20
20.000	0.1076E-18	0.2522E-18	0.1236E-19	0.5339E-19
21.000				0.1624E-18
22.000				0.6352E-18
22.100				0.6701E-18
22.200				0.6791E-18
22.300				0.6608E-18
22.400				0.6199E-18
22.500				0.5648E-18
22.600				0.5041E-18
22.700				0.4441E-18
22.800				0.3887E-18
22.900				0.3396E-18
23.000				0.2970E-18
24.000				0.9963E-19
25.000	0.8299E-19	0.2252E-18	0.1661E-19	0.4942E-19
30.000	0.6374E-19	0.2011E-18	0.2140E-19	0.1106E-19
35.000	0.4873E-19	0.1796E-18	0.2679E-19	0.6864E-20
40.000	0.3705E-19	0.1605E-18	0.3293E-19	0.5844E-20
45.000	0.2796E-19	0.1436E-18	0.3999E-19	0.5655E-20
48.043	0.2436E-19			
48.044	0.2435E-19			
48.045	0.2435E-19			
48.046	0.2435E-19			
48.047	0.2435E-19			
48.048	0.2434E-19			
48.049	0.2434E-19			
48.050	0.2434E-19			
48.051	0.2434E-19			
48.052	0.2434E-19	0.1354E-18		
48.062	0.2432E-19	0.1353E-18		
48.072	0.2430E-19	0.1353E-18		
48.082	0.2428E-19	0.1353E-18		
48.092	0.2427E-19	0.1352E-18		
48.102	0.2425E-19	0.1352E-18		

Table 26: (continue) Cross sections $\sigma_{11}(\mathrm{cm}^2)$ $t\mu + d \rightarrow t\mu + d$.

ε_1(eV)	$J=0$	$J=1$	$J=2$	$J=3$
48.112	0.2423E-19	0.1352E-18		
48.122	0.2422E-19	0.1352E-18		
48.132	0.2420E-19	0.1351E-18		
48.142	0.2419E-19	0.1351E-18	0.4851E-19	
48.162	0.2416E-19	0.1350E-18	0.4851E-19	
48.182	0.2412E-19	0.1350E-18	0.4855E-19	
48.202	0.2409E-19	0.1349E-18	0.4859E-19	
48.222	0.2406E-19	0.1348E-18	0.4863E-19	
48.242	0.2403E-19	0.1348E-18	0.4867E-19	
48.342	0.2388E-19	0.1344E-18	0.4888E-19	
48.442	0.2374E-19	0.1341E-18	0.4909E-19	
48.542	0.2359E-19	0.1338E-18	0.4931E-19	
48.642	0.2345E-19	0.1334E-18	0.4953E-19	
48.742	0.2330E-19	0.1331E-18	0.4975E-19	
48.842	0.2316E-19	0.1328E-18	0.4998E-19	
48.942	0.2302E-19	0.1324E-18	0.5020E-19	
49.042	0.2288E-19	0.1321E-18	0.5043E-19	0.5391E-20
49.242	0.2261E-19	0.1316E-18		0.5402E-20
49.442	0.2234E-19	0.1309E-18		0.5413E-20
49.642	0.2207E-19	0.1302E-18		0.5424E-20
49.842	0.2180E-19	0.1295E-18		0.5436E-20
50.042	0.2154E-19	0.1288E-18	0.5261E-19	0.5448E-20
51.042	0.2027E-19	0.1254E-18	0.5474E-19	0.5537E-20
52.042	0.1907E-19	0.1222E-18	0.5681E-19	0.5597E-20
53.042	0.1794E-19	0.1191E-18	0.5856E-19	0.5657E-20
54.042	0.1686E-19	0.1161E-18	0.6014E-19	0.5710E-20
55.042	0.1584E-19	0.1132E-18	0.6132E-19	0.5777E-20
56.042	0.1488E-19	0.1104E-18	0.6225E-19	0.5850E-20
57.042	0.1396E-19	0.1077E-18	0.6285E-19	0.5933E-20
58.042	0.1309E-19	0.1051E-18	0.6314E-19	0.6003E-20
63.042	0.9363E-20	0.9305E-19	0.6154E-19	0.6416E-20
68.042	0.6537E-20	0.8254E-19	0.5714E-19	0.6813E-20
73.042	0.4402E-20	0.7324E-19	0.5236E-19	0.7186E-20
75.042	0.3709E-20			
76.042	0.3397E-20			
77.042	0.3104E-20			
78.042	0.2835E-20	0.6497E-19	0.4782E-19	0.7541E-20
83.042	0.1706E-20	0.5762E-19	0.4388E-19	0.7895E-20
88.042	0.9137E-21	0.5104E-19	0.4043E-19	0.8237E-20
93.042	0.4102E-21	0.4513E-19	0.3738E-19	0.8537E-20
98.042	0.1230E-21	0.3981E-19	0.3470E-19	0.8874E-20

Table 27: Cross sections $\sigma_{12}(\mathrm{cm}^2)$ $t\mu + d \to d\mu + t$.

ε_1(eV)	$J = 0$	$J = 1$	$J = 2$	$J = 3$
48.043	0.2871E-23			
48.044	0.4056E-23			
48.045	0.4963E-23			
48.046	0.5726E-23			
48.047	0.6397E-23			
48.048	0.7003E-23			
48.049	0.7559E-23			
48.050	0.8075E-23			
48.051	0.8559E-23			
48.052	0.9016E-23	0.2407E-24		
48.062	0.1268E-22	0.6800E-24		
48.072	0.1545E-22	0.1248E-23		
48.082	0.1775E-22	0.1919E-23		
48.092	0.1976E-22	0.2678E-23		
48.102	0.2157E-22	0.3480E-23		
48.112	0.2321E-22	0.4381E-23		
48.122	0.2472E-22	0.5346E-23		
48.132	0.2613E-22	0.6371E-23		
48.142	0.2745E-22	0.7451E-23	0.2110E-24	
48.162	0.2989E-22	0.9768E-23	0.3335E-24	
48.182	0.3210E-22	0.1227E-22	0.4898E-24	
48.202	0.3413E-22	0.1495E-22	0.6833E-24	
48.222	0.3601E-22	0.1779E-22	0.9164E-24	
48.242	0.3777E-22	0.2078E-22	0.1192E-23	
48.342	0.4526E-22	0.3759E-22	0.3268E-23	
48.442	0.5128E-22	0.5692E-22	0.6677E-23	
48.542	0.5636E-22	0.7820E-22	0.1161E-22	
48.642	0.6076E-22	0.1011E-21	0.1822E-22	
48.742	0.6465E-22	0.1252E-21	0.2666E-22	
48.842	0.6814E-22	0.1502E-21	0.3704E-22	
48.942	0.7130E-22	0.1760E-21	0.4947E-22	
49.042	0.7420E-22	0.2020E-21	0.6405E-22	0.4269E-26
49.242	0.7933E-22	0.2584E-21		0.8214E-26
49.442	0.8379E-22	0.3155E-21		0.1439E-25
49.642	0.8775E-22	0.3732E-21		0.2354E-25
49.842	0.9130E-22	0.4311E-21		0.3649E-25
50.042	0.9453E-22	0.4882E-21	0.3422E-21	0.5420E-25
51.042	0.1074E-21	0.7499E-21	0.8852E-21	0.2528E-24
52.042	0.1168E-21	0.9886E-21	0.1697E-20	0.7611E-24
53.042	0.1240E-21	0.1196E-20	0.2745E-20	0.1791E-23

Table 27: (continue) Cross sections $\sigma_{12}(\mathrm{cm}^2)$ $t\mu + d \rightarrow d\mu + t$.

ε_1(eV)	$J = 0$	$J = 1$	$J = 2$	$J = 3$
54.042	0.1295E-21	0.1376E-20	0.3994E-20	0.3615E-23
55.042	0.1340E-21	0.1529E-20	0.5378E-20	0.6515E-23
56.042	0.1378E-21	0.1659E-20	0.6856E-20	0.1082E-22
57.042	0.1408E-21	0.1770E-20	0.8370E-20	0.1689E-22
58.042	0.1432E-21	0.1864E-20	0.9874E-20	0.2501E-22
63.042	0.1507E-21	0.2150E-20	0.1640E-19	0.1091E-21
68.042	0.1536E-21	0.2248E-20	0.2045E-19	0.2901E-21
73.042	0.1542E-21	0.2247E-20	0.2252E-19	0.5870E-21
75.042	0.1539E-21			
76.042	0.1538E-21			
77.042	0.1536E-21			
78.042	0.1535E-21	0.2194E-20	0.2328E-19	0.9997E-21
83.042	0.1517E-21	0.2114E-20	0.2334E-19	0.1517E-20
88.042	0.1493E-21	0.2021E-20	0.2300E-19	0.2115E-20
93.042	0.1470E-21	0.1926E-20	0.2242E-19	0.2760E-20
98.042	0.1448E-21	0.1828E-20	0.2171E-19	0.3442E-20

Table 17: (continue) Cross sections $\sigma_{12}(\text{cm}^2)$ $d\mu + p \to p\mu + d$.

ε_1(eV)	$J=0$	$J=1$	$J=2$	$J=3$
140.709	0.2733E-20	0.2243E-20	0.2488E-25	0.8381E-23
141.709	0.2847E-20	0.2655E-20	0.1887E-25	0.1415E-22
142.709	0.2944E-20	0.3051E-20	0.1033E-25	0.2229E-22
143.709	0.3027E-20	0.3430E-20	0.2735E-26	0.3322E-22
144.709	0.3100E-20	0.3791E-20	0.9059E-28	0.4741E-22
149.709	0.3356E-20	0.5325E-20	0.2495E-24	0.1820E-21
154.709	0.3476E-20	0.6438E-20	0.1635E-23	0.4591E-21
159.709	0.3571E-20	0.7241E-20	0.5161E-23	0.9176E-21
164.709	0.3603E-20	0.7801E-20	0.1176E-22	0.1575E-20
169.709	0.3619E-20	0.8192E-20	0.2222E-22	0.2430E-20
174.709	0.3602E-20	0.8467E-20	0.3689E-22	0.3454E-20
179.709	0.3581E-20	0.8662E-20	0.5580E-22	0.4591E-20
184.709	0.3551E-20	0.8801E-20	0.7887E-22	0.5780E-20

Table 18: Cross sections $\sigma_{21}(\text{cm}^2)$ $p\mu + d \to d\mu + p$.

ε_2(eV)	$J=0$	$J=1$	$J=2$	$J=3$
0.001	0.7238E-17			
0.002	0.5108E-17			
0.003	0.4164E-17			
0.004	0.3601E-17			
0.005	0.3217E-17			
0.006	0.2934E-17			
0.007	0.2713E-17			
0.008	0.2536E-17			
0.009	0.2388E-17			
0.010	0.2264E-17	0.2594E-20		
0.020	0.1589E-17	0.3670E-20		
0.030	0.1290E-17	0.4496E-20		
0.040	0.1111E-17	0.5194E-20		
0.050	0.9891E-18	0.5809E-20		
0.060	0.8990E-18	0.6365E-20		
0.070	0.8290E-18	0.6877E-20		
0.080	0.7726E-18	0.7354E-20		
0.090	0.7259E-18	0.7802E-20		
0.100	0.6863E-18	0.8226E-20	0.9684E-27	
0.120	0.6226E-18	0.9012E-20		
0.140	0.5731E-18	0.9738E-20		
0.160	0.5332E-18	0.1041E-19		
0.180	0.5001E-18	0.1105E-19		
0.200	0.4722E-18	0.1165E-19	0.3226E-26	
0.300	0.3775E-18	0.1427E-19	0.6834E-26	
0.400	0.3213E-18	0.1647E-19	0.1192E-25	
0.500	0.2831E-18	0.1841E-19	0.1859E-25	
0.600	0.2550E-18	0.2014E-19	0.2692E-25	
0.700	0.2333E-18	0.2172E-19	0.3696E-25	
0.800	0.2158E-18	0.2318E-19	0.4874E-25	
0.900	0.2014E-18	0.2453E-19	0.6224E-25	
1.000	0.1893E-18	0.2581E-19	0.7743E-25	0.2465E-23
1.200	0.1698E-18	0.2812E-19	0.1126E-24	0.3836E-23
1.400	0.1547E-18	0.3019E-19	0.1535E-24	0.5568E-23
1.600	0.1426E-18	0.3207E-19	0.1990E-24	0.7682E-23
1.800	0.1326E-18	0.3377E-19	0.2482E-24	0.1020E-22
2.000	0.1241E-18	0.3534E-19	0.2995E-24	0.1313E-22
3.000	0.9583E-19	0.4136E-19	0.5453E-24	0.3465E-22
4.000	0.7934E-19	0.4528E-19	0.6863E-24	0.6908E-22
5.000	0.6834E-19	0.4787E-19	0.6774E-24	0.1184E-21

Table 18: (continue) Cross sections $\sigma_{21}(\mathrm{cm}^2)$ $p\mu + d \rightarrow d\mu + p$.

ε_2(eV)	$J=0$	$J=1$	$J=2$	$J=3$
6.000	0.6038E-19	0.4957E-19	0.5476E-24	0.1845E-21
7.000	0.5430E-19	0.5065E-19	0.3588E-24	0.2691E-21
8.000	0.4949E-19	0.5130E-19	0.1731E-24	0.3734E-21
9.000	0.4557E-19	0.5163E-19	0.4102E-25	0.4984E-21
10.000	0.4230E-19	0.5173E-19	0.1232E-26	0.6447E-21
15.000	0.3160E-19	0.5015E-19	0.2342E-23	0.1709E-20
20.000	0.2538E-19	0.4702E-19	0.1191E-22	0.3345E-20
25.000	0.2155E-19	0.4371E-19	0.3109E-22	0.5527E-20
30.000	0.1870E-19	0.4049E-19	0.6095E-22	0.8159E-20
35.000	0.1660E-19	0.3758E-19	0.1018E-21	0.1113E-19
40.000	0.1489E-19	0.3501E-19	0.1523E-21	0.1426E-19
45.000	0.1354E-19	0.3276E-19	0.2109E-21	0.1735E-19
50.000	0.1243E-19	0.3081E-19	0.2759E-21	0.2022E-19

Table 19: Cross sections $\sigma_{22}(\text{cm}^2)$ $p\mu + d \rightarrow p\mu + d$.

ε_2(eV)	$J = 0$	$J = 1$	$J = 2$	$J = 3$
0.001	0.6010E-19			
0.002	0.6087E-19			
0.003	0.6146E-19			
0.004	0.6196E-19			
0.005	0.6239E-19			
0.006	0.6279E-19			
0.007	0.6315E-19			
0.008	0.6348E-19			
0.009	0.6379E-19			
0.010	0.6409E-19	0.3304E-22		
0.020	0.6646E-19	0.6667E-22		
0.030	0.6826E-19	0.1006E-21		
0.040	0.6976E-19	0.1346E-21		
0.050	0.7108E-19	0.1685E-21		
0.060	0.7226E-19	0.2025E-21		
0.070	0.7334E-19	0.2363E-21		
0.080	0.7434E-19	0.2699E-21		
0.090	0.7528E-19	0.3033E-21		
0.100	0.7616E-19	0.3365E-21	0.1089E-22	
0.120	0.7778E-19	0.4017E-21		
0.140	0.7925E-19	0.4658E-21		
0.160	0.8061E-19	0.5285E-21		
0.180	0.8186E-19	0.5897E-21		
0.200	0.8304E-19	0.6493E-21	0.2202E-22	
0.300	0.8795E-19	0.9221E-21	0.3337E-22	
0.400	0.9177E-19	0.1153E-20	0.4492E-22	
0.500	0.9485E-19	0.1347E-20	0.5661E-22	
0.600	0.9738E-19	0.1508E-20	0.6839E-22	
0.700	0.9948E-19	0.1642E-20	0.8021E-22	
0.800	0.1013E-18	0.1755E-20	0.9205E-22	
0.900	0.1027E-18	0.1852E-20	0.1039E-21	
1.000	0.1040E-18	0.1939E-20	0.1157E-21	0.1710E-22
1.200	0.1061E-18	0.2077E-20	0.1391E-21	0.2054E-22
1.400	0.1076E-18	0.2195E-20	0.1623E-21	0.2393E-22
1.600	0.1088E-18	0.2301E-20	0.1852E-21	0.2729E-22
1.800	0.1098E-18	0.2399E-20	0.2079E-21	0.3061E-22
2.000	0.1106E-18	0.2495E-20	0.2303E-21	0.3390E-22
3.000	0.1128E-18	0.2817E-20	0.3372E-21	0.5064E-22
4.000	0.1133E-18	0.2898E-20	0.4341E-21	0.6868E-22
5.000	0.1129E-18	0.2842E-20	0.5224E-21	0.8766E-22

Table 19: (continue) Cross sections $\sigma_{22}(\text{cm}^2)$ $p\mu + d \rightarrow p\mu + d$.

ε_2(eV)	$J=0$	$J=1$	$J=2$	$J=3$
6.000	0.1119E-18	0.2764E-20	0.6052E-21	0.1072E-21
7.000	0.1106E-18	0.2712E-20	0.6820E-21	0.1283E-21
8.000	0.1091E-18	0.2700E-20	0.7494E-21	0.1520E-21
9.000	0.1075E-18	0.2736E-20	0.8046E-21	0.1787E-21
10.000	0.1058E-18	0.2829E-20	0.8475E-21	0.2077E-21
15.000	0.9628E-19	0.4145E-20	0.8935E-21	0.3765E-21
20.000	0.8702E-19	0.6341E-20	0.7160E-21	0.5716E-21
25.000	0.7812E-19	0.8904E-20	0.4530E-21	0.7762E-21
30.000	0.7029E-19	0.1154E-19	0.2035E-21	0.9755E-21
35.000	0.6315E-19	0.1414E-19	0.4355E-22	0.1162E-20
40.000	0.5693E-19	0.1655E-19	0.3266E-23	0.1353E-20
45.000	0.5130E-19	0.1884E-19	0.1000E-21	0.1511E-20
50.000	0.4623E-19	0.2091E-19	0.3396E-21	0.1689E-20

Table 20.a: Total cross sections $\sigma_{11}(cm^2)$: $d\mu + p \rightarrow d\mu + p$, below $p\mu - d$ threshold.

ε_1(eV)	σ_{11}
0.001	0.2371E-19
0.002	0.2219E-19
0.003	0.2183E-19
0.004	0.2139E-19
0.005	0.2102E-19
0.006	0.2084E-19
0.007	0.2032E-19
0.008	0.2089E-19
0.009	0.2084E-19
0.010	0.2000E-19
0.020	0.1827E-19
0.030	0.1688E-19
0.040	0.1681E-19
0.050	0.1505E-19
0.060	0.1507E-19
0.070	0.1420E-19
0.080	0.1351E-19
0.090	0.1299E-19
0.100	0.1261E-19
0.120	0.1171E-19
0.140	0.1085E-19
0.160	0.1018E-19
0.180	0.9609E-20
0.200	0.9057E-20
0.300	0.6935E-20
0.400	0.5447E-20
0.500	0.4391E-20
0.600	0.3588E-20
0.700	0.2950E-20
0.800	0.2487E-20
0.900	0.2099E-20
1.000	0.1833E-20
1.200	0.1439E-20
1.400	0.1215E-20
1.600	0.1136E-20
1.800	0.1145E-20
2.000	0.1219E-20
3.000	0.2158E-20
4.000	0.3512E-20
5.000	0.5005E-20

ε_1(eV)	σ_{11}
6.000	0.6556E-20
7.000	0.8137E-20
8.000	0.9750E-20
9.000	0.1140E-19
10.000	0.1308E-19
15.000	0.2258E-19
20.000	0.3555E-19
25.000	0.5701E-19
30.000	0.9829E-19
35.000	0.1830E-18
40.000	0.3272E-18
45.000	0.4455E-18
47.000	0.4544E-18
49.000	0.4434E-18
50.000	0.4331E-18
51.000	0.4201E-18
53.000	0.3915E-18
55.000	0.3627E-18

Table 20.b: Total cross sections $\sigma_{ij}(\mathrm{cm}^2)$: $d\mu+p, p\mu+d$, above $p\mu-d$ threshold.

ε_2(eV)	σ_{11}	σ_{12}	σ_{21}	σ_{22}
0.001	0.1502E-18	0.5711E-22	0.7238E-17	0.6010E-19
0.002	0.1502E-18	0.8062E-22	0.5109E-17	0.6088E-19
0.003	0.1502E-18	0.9860E-22	0.4165E-17	0.6147E-19
0.004	0.1502E-18	0.1137E-21	0.3602E-17	0.6197E-19
0.005	0.1502E-18	0.1270E-21	0.3218E-17	0.6241E-19
0.006	0.1502E-18	0.1389E-21	0.2936E-17	0.6281E-19
0.007	0.1501E-18	0.1499E-21	0.2715E-17	0.6317E-19
0.008	0.1501E-18	0.1602E-21	0.2538E-17	0.6351E-19
0.009	0.1501E-18	0.1697E-21	0.2390E-17	0.6382E-19
0.010	0.1501E-18	0.1787E-21	0.2267E-17	0.6412E-19
0.020	0.1501E-18	0.2512E-21	0.1593E-17	0.6653E-19
0.030	0.1500E-18	0.3062E-21	0.1294E-17	0.6836E-19
0.040	0.1500E-18	0.3520E-21	0.1116E-17	0.6990E-19
0.050	0.1499E-18	0.3922E-21	0.9949E-18	0.7125E-19
0.060	0.1499E-18	0.4283E-21	0.9054E-18	0.7247E-19
0.070	0.1499E-18	0.4613E-21	0.8359E-18	0.7359E-19
0.080	0.1498E-18	0.4918E-21	0.7800E-18	0.7462E-19
0.090	0.1498E-18	0.5204E-21	0.7337E-18	0.7559E-19
0.100	0.1498E-18	0.5474E-21	0.6945E-18	0.7651E-19
0.120	0.1497E-18	0.5973E-21	0.6316E-18	0.7820E-19
0.140	0.1497E-18	0.6429E-21	0.5828E-18	0.7973E-19
0.160	0.1496E-18	0.6851E-21	0.5436E-18	0.8116E-19
0.180	0.1496E-18	0.7248E-21	0.5112E-18	0.8247E-19
0.200	0.1496E-18	0.7620E-21	0.4839E-18	0.8371E-19
0.300	0.1494E-18	0.9250E-21	0.3918E-18	0.8891E-19
0.400	0.1492E-18	0.1063E-20	0.3378E-18	0.9297E-19
0.500	0.1491E-18	0.1184E-20	0.3015E-18	0.9626E-19
0.600	0.1489E-18	0.1296E-20	0.2751E-18	0.9897E-19
0.700	0.1488E-18	0.1400E-20	0.2550E-18	0.1012E-18
0.800	0.1486E-18	0.1499E-20	0.2390E-18	0.1032E-18
0.900	0.1485E-18	0.1593E-20	0.2259E-18	0.1047E-18
1.000	0.1483E-18	0.1683E-20	0.2151E-18	0.1061E-18
1.200	0.1482E-18	0.1856E-20	0.1979E-18	0.1083E-18
1.400	0.1481E-18	0.2020E-20	0.1849E-18	0.1100E-18
1.600	0.1481E-18	0.2177E-20	0.1747E-18	0.1113E-18
1.800	0.1480E-18	0.2330E-20	0.1664E-18	0.1124E-18
2.000	0.1479E-18	0.2478E-20	0.1595E-18	0.1134E-18
3.000	0.1476E-18	0.3175E-20	0.1372E-18	0.1160E-18
4.000	0.1475E-18	0.3817E-20	0.1247E-18	0.1167E-18
5.000	0.1475E-18	0.4420E-20	0.1163E-18	0.1164E-18

Table 20.b: (continue) Total cross sections $\sigma_{ij}(\text{cm}^2)$: $d\mu + p, p\mu + d$, above $p\mu - d$ threshold.

ε_2(eV)	σ_{11}	σ_{12}	σ_{21}	σ_{22}
6.000	0.1475E-18	0.4984E-20	0.1101E-18	0.1154E-18
7.000	0.1477E-18	0.5516E-20	0.1052E-18	0.1141E-18
8.000	0.1479E-18	0.6017E-20	0.1012E-18	0.1127E-18
9.000	0.1482E-18	0.6490E-20	0.9770E-19	0.1112E-18
10.000	0.1486E-18	0.6938E-20	0.9467E-19	0.1097E-18
15.000	0.1513E-18	0.8863E-20	0.8346E-19	0.1017E-18
20.000	0.1550E-18	0.1037E-19	0.7576E-19	0.9465E-19
25.000	0.1596E-18	0.1173E-19	0.7082E-19	0.8825E-19
30.000	0.1645E-18	0.1299E-19	0.6741E-19	0.8301E-19
35.000	0.1694E-18	0.1426E-19	0.6541E-19	0.7850E-19
40.000	0.1742E-18	0.1556E-19	0.6431E-19	0.7484E-19
45.000	0.1786E-18	0.1689E-19	0.6386E-19	0.7175E-19
50.000	0.1822E-18	0.1821E-19	0.6374E-19	0.6917E-19

Table 21: Cross sections $\sigma_{11}(\text{cm}^2)$ $t\mu + p \to t\mu + p$.

ε_1(eV)	$J=0$	$J=1$	$J=2$	$J=3$
0.001	0.4590E-19			
0.002	0.4532E-19			
0.003	0.4467E-19			
0.004	0.4386E-19			
0.005	0.4351E-19			
0.006	0.4322E-19			
0.007	0.4154E-19			
0.008	0.4214E-19			
0.009	0.4202E-19			
0.010	0.4171E-19	0.2716E-22		
0.020	0.3835E-19	0.5308E-22		
0.030	0.3720E-19	0.7776E-22		
0.040	0.3594E-19	0.1013E-21		
0.050	0.3426E-19	0.1249E-21		
0.060	0.3265E-19	0.1478E-21		
0.070	0.3138E-19	0.1701E-21		
0.080	0.3016E-19	0.1908E-21		
0.090	0.2951E-19	0.2128E-21		
0.100	0.2861E-19	0.2327E-21	0.9872E-23	
0.120	0.2679E-19	0.2716E-21	0.1177E-22	
0.140	0.2545E-19	0.3144E-21	0.1379E-22	
0.160	0.2419E-19	0.3520E-21	0.1577E-22	
0.180	0.2303E-19	0.3870E-21	0.1779E-22	
0.200	0.2196E-19	0.4221E-21	0.1977E-22	
0.300	0.1766E-19	0.5819E-21	0.2964E-22	
0.400	0.1463E-19	0.7167E-21	0.4018E-22	
0.500	0.1210E-19	0.8400E-21	0.5037E-22	
0.600	0.1013E-19	0.9400E-21	0.6084E-22	
0.700	0.8579E-20	0.9965E-21	0.7033E-22	
0.800	0.7239E-20	0.1086E-20	0.8167E-22	
0.900	0.6148E-20	0.1157E-20	0.9311E-22	
1.000	0.5200E-20	0.1197E-20	0.1031E-21	0.1528E-22
1.200	0.3710E-20	0.1274E-20	0.1265E-21	0.1825E-22
1.400	0.2611E-20	0.1323E-20	0.1485E-21	0.2130E-22
1.600	0.1791E-20	0.1367E-20	0.1728E-21	0.2483E-22
1.800	0.1185E-20	0.1382E-20	0.1972E-21	0.2744E-22
2.000	0.7403E-21	0.1384E-20	0.2231E-21	0.3091E-22
3.000	0.2383E-23	0.1248E-20	0.3627E-21	0.4522E-22
4.000	0.5076E-21	0.9844E-21	0.5326E-21	0.6165E-22
5.000	0.1509E-20	0.6894E-21	0.7357E-21	0.7755E-22

Table 21: (continue) Cross sections $\sigma_{11}(\mathrm{cm}^2)$ $t\mu + p \to t\mu + p$.

ε_1(eV)	$J=0$	$J=1$	$J=2$	$J=3$
6.000	0.2710E-20	0.4198E-21	0.9890E-21	0.9393E-22
7.000	0.3977E-20	0.2096E-21	0.1306E-20	0.1102E-21
8.000	0.5244E-20	0.6958E-22	0.1695E-20	0.1272E-21
9.000	0.6475E-20	0.4728E-23	0.2159E-20	0.1445E-21
10.000	0.7655E-20	0.1563E-22	0.2733E-20	0.1624E-21
15.000	0.1267E-19	0.1069E-20	0.8183E-20	0.2579E-21
20.000	0.1630E-19	0.3285E-20	0.2295E-19	0.3686E-21
25.000	0.1894E-19	0.6088E-20	0.6394E-19	0.4941E-21
30.000	0.2083E-19	0.9166E-20	0.1746E-18	0.6407E-21
35.000	0.2218E-19	0.1216E-19	0.3742E-18	0.8114E-21
36.000			0.4065E-18	
37.000			0.4289E-18	
38.000			0.4402E-18	
39.000			0.4409E-18	
40.000	0.2312E-19	0.1507E-19	0.4327E-18	0.1017E-20
41.000			0.4180E-18	
42.000			0.3993E-18	
43.000			0.3786E-18	
44.000			0.3573E-18	
45.000	0.2374E-19	0.1777E-19	0.3365E-18	0.1260E-20
50.000	0.2419E-19	0.2025E-19	0.2526E-18	0.1552E-20
182.752	0.1447E-19			
182.753	0.1446E-19			
182.754	0.1445E-19			
182.755	0.1444E-19			
182.756	0.1443E-19			
182.757	0.1443E-19			
182.758	0.1442E-19			
182.759	0.1441E-19			
182.760	0.1441E-19			
182.761	0.1441E-19	0.2457E-19		
182.771	0.1438E-19	0.2456E-19		
182.781	0.1435E-19	0.2456E-19		
182.791	0.1433E-19	0.2455E-19		
182.801	0.1431E-19	0.2455E-19		
182.811	0.1429E-19	0.2455E-19		
182.821	0.1428E-19	0.2454E-19		
182.831	0.1426E-19	0.2454E-19		
182.841	0.1425E-19	0.2453E-19		
182.851	0.1424E-19	0.2453E-19	0.6248E-19	

Table 21: (continue) Cross sections $\sigma_{11}(\text{cm}^2)$ $t\mu + p \rightarrow t\mu + p$.

ε_1(eV)	$J=0$	$J=1$	$J=2$	$J=3$
182.871	0.1421E-19	0.2452E-19		
182.891	0.1419E-19	0.2450E-19		
182.911	0.1417E-19	0.2449E-19		
182.931	0.1415E-19	0.2448E-19		
182.951	0.1414E-19	0.2447E-19	0.6246E-19	
183.051	0.1406E-19	0.2442E-19	0.6245E-19	
183.151	0.1401E-19	0.2437E-19	0.6244E-19	
183.251	0.1396E-19	0.2431E-19	0.6242E-19	
183.351	0.1391E-19	0.2426E-19	0.6241E-19	
183.451	0.1388E-19	0.2421E-19	0.6240E-19	
183.551	0.1384E-19	0.2415E-19	0.6238E-19	
183.651	0.1381E-19	0.2410E-19	0.6237E-19	
183.751	0.1378E-19	0.2404E-19	0.6236E-19	0.9132E-19
183.951	0.1372E-19	0.2393E-19	0.6233E-19	0.9151E-19
184.151	0.1367E-19	0.2382E-19	0.6230E-19	0.9169E-19
184.351	0.1363E-19	0.2371E-19	0.6228E-19	0.9188E-19
184.551	0.1359E-19	0.2361E-19	0.6225E-19	0.9206E-19
184.751	0.1355E-19	0.2350E-19	0.6222E-19	0.9224E-19
185.751	0.1340E-19	0.2300E-19	0.6209E-19	0.9313E-19
186.751	0.1327E-19	0.2254E-19	0.6195E-19	0.9400E-19
187.751	0.1316E-19	0.2212E-19	0.6181E-19	0.9483E-19
188.751	0.1307E-19	0.2175E-19	0.6166E-19	0.9564E-19
189.751	0.1298E-19	0.2142E-19	0.6151E-19	0.9641E-19
190.751	0.1291E-19	0.2112E-19	0.6135E-19	0.9715E-19
191.751	0.1283E-19	0.2085E-19	0.6119E-19	0.9786E-19
192.751	0.1276E-19	0.2061E-19	0.6103E-19	0.9854E-19
197.751	0.1245E-19	0.1971E-19	0.6014E-19	0.1014E-18
202.751	0.1218E-19	0.1914E-19	0.5930E-19	0.1034E-18
207.751	0.1194E-19	0.1875E-19	0.5845E-19	0.1046E-18
212.751	0.1171E-19	0.1848E-19	0.5757E-19	0.1050E-18
217.751	0.1149E-19	0.1828E-19	0.5669E-19	0.1048E-18
222.751	0.1128E-19	0.1812E-19	0.5584E-19	0.1040E-18
227.751	0.1107E-19	0.1797E-19	0.5503E-19	0.1027E-18
232.751	0.1087E-19	0.1783E-19	0.5425E-19	0.1012E-18

Table 22: Cross sections $\sigma_{12}(\mathrm{cm}^2)$ $t\mu + p \rightarrow p\mu + t$.

ε_1(eV)	$J=0$	$J=1$	$J=2$	$J=3$
182.752	0.1977E-22			
182.753	0.2792E-22			
182.754	0.3415E-22			
182.755	0.3940E-22			
182.756	0.4401E-22			
182.757	0.4817E-22			
182.758	0.5199E-22			
182.759	0.5554E-22			
182.760	0.5887E-22			
182.761	0.6201E-22	0.1516E-24		
182.771	0.8723E-22	0.4287E-24		
182.781	0.1063E-21	0.7876E-24		
182.791	0.1223E-21	0.1212E-23		
182.801	0.1362E-21	0.1694E-23		
182.811	0.1486E-21	0.2227E-23		
182.821	0.1600E-21	0.2805E-23		
182.831	0.1705E-21	0.3427E-23		
182.841	0.1803E-21	0.4088E-23		
182.851	0.1895E-21	0.4786E-23	0.8435E-27	
182.871	0.2065E-21	0.6288E-23		
182.891	0.2220E-21	0.7918E-23		
182.911	0.2362E-21	0.9668E-23		
182.931	0.2494E-21	0.1153E-22		
182.951	0.2618E-21	0.1349E-22	0.4788E-26	
183.051	0.3150E-21	0.2468E-22	0.1323E-25	
183.151	0.3583E-21	0.3782E-22	0.2721E-25	
183.251	0.3955E-21	0.5258E-22	0.4760E-25	
183.351	0.4284E-21	0.6874E-22	0.7516E-25	
183.451	0.4579E-21	0.8614E-22	0.1105E-24	
183.551	0.4849E-21	0.1046E-21	0.1544E-24	
183.651	0.5098E-21	0.1241E-21	0.2072E-24	
183.751	0.5329E-21	0.1445E-21	0.2694E-24	0.1348E-25
183.951	0.5746E-21	0.1876E-21	0.4242E-24	0.2524E-25
184.151	0.6116E-21	0.2334E-21	0.6220E-24	0.4287E-25
184.351	0.6446E-21	0.2816E-21	0.8655E-24	0.6780E-25
184.551	0.6745E-21	0.3317E-21	0.1157E-23	0.1015E-24
184.751	0.7018E-21	0.3834E-21	0.1500E-23	0.1457E-24
185.751	0.8102E-21	0.6591E-21	0.4037E-23	0.5827E-24
186.751	0.8929E-21	0.9493E-21	0.8095E-23	0.1549E-23
187.751	0.9622E-21	0.1242E-20	0.1383E-22	0.3285E-23

Table 22: (continue) Cross sections $\sigma_{12}(\mathrm{cm}^2)$ $t\mu + p \rightarrow p\mu + t$.

ε_1(eV)	$J=0$	$J=1$	$J=2$	$J=3$
188.751	0.1018E-20	0.1529E-20	0.2133E-22	0.6031E-23
189.751	0.1064E-20	0.1806E-20	0.3067E-22	0.1001E-22
190.751	0.1103E-20	0.2070E-20	0.4184E-22	0.1545E-22
191.751	0.1138E-20	0.2320E-20	0.5485E-22	0.2255E-22
192.751	0.1170E-20	0.2557E-20	0.6966E-22	0.3148E-22
197.751	0.1304E-20	0.3547E-20	0.1686E-21	0.1093E-21
202.751	0.1386E-20	0.4279E-20	0.3019E-21	0.2491E-21
207.751	0.1439E-20	0.4820E-20	0.4591E-21	0.4479E-21
212.751	0.1477E-20	0.5227E-20	0.6313E-21	0.6934E-21
217.751	0.1500E-20	0.5536E-20	0.8098E-21	0.9663E-21
222.751	0.1518E-20	0.5769E-20	0.9889E-21	0.1248E-20
227.751	0.1533E-20	0.5941E-20	0.1164E-20	0.1525E-20
232.751	0.1541E-20	0.6071E-20	0.1335E-20	0.1782E-20

Table 23: Cross sections $\sigma_{21}(cm^2)$ $p\mu + t \rightarrow t\mu + p$.

ε_2(eV)	$J = 0$	$J = 1$	$J = 2$	$J = 3$
0.001	0.3470E-17			
0.002	0.2450E-17			
0.003	0.1998E-17			
0.004	0.1729E-17			
0.005	0.1545E-17			
0.006	0.1409E-17			
0.007	0.1304E-17			
0.008	0.1219E-17			
0.009	0.1148E-17			
0.010	0.1088E-17	0.2513E-20		
0.020	0.7653E-18	0.3554E-20		
0.030	0.6217E-18	0.4353E-20		
0.040	0.5360E-18	0.5027E-20		
0.050	0.4774E-18	0.5620E-20		
0.060	0.4342E-18	0.6156E-20		
0.070	0.4005E-18	0.6648E-20		
0.080	0.3734E-18	0.7107E-20		
0.090	0.3509E-18	0.7537E-20		
0.100	0.3318E-18	0.7944E-20	0.1414E-23	
0.120	0.3012E-18	0.8699E-20		
0.140	0.2773E-18	0.9392E-20		
0.160	0.2581E-18	0.1004E-19		
0.180	0.2421E-18	0.1064E-19		
0.200	0.2286E-18	0.1121E-19	0.4014E-23	
0.300	0.1830E-18	0.1369E-19	0.7398E-23	
0.400	0.1558E-18	0.1575E-19	0.1142E-22	
0.500	0.1374E-18	0.1754E-19	0.1599E-22	
0.600	0.1238E-18	0.1914E-19	0.2105E-22	
0.700	0.1133E-18	0.2058E-19	0.2656E-22	
0.800	0.1049E-18	0.2190E-19	0.3247E-22	
0.900	0.9795E-19	0.2312E-19	0.3876E-22	
1.000	0.9209E-19	0.2425E-19	0.4539E-22	0.2270E-23
1.200	0.8269E-19	0.2629E-19	0.5962E-22	0.3548E-23
1.400	0.7542E-19	0.2810E-19	0.7501E-22	0.5171E-23
1.600	0.6959E-19	0.2971E-19	0.9144E-22	0.7163E-23
1.800	0.6479E-19	0.3116E-19	0.1088E-21	0.9547E-23
2.000	0.6074E-19	0.3248E-19	0.1271E-21	0.1234E-22
3.000	0.4720E-19	0.3749E-19	0.2293E-21	0.3309E-22
4.000	0.3909E-19	0.4074E-19	0.3468E-21	0.6636E-22
5.000	0.3384E-19	0.4285E-19	0.4765E-21	0.1132E-21

Table 23: (continue) Cross sections $\sigma_{21}(\mathrm{cm}^2)$ $p\mu + t \rightarrow t\mu + p$.

ε_2(eV)	$J=0$	$J=1$	$J=2$	$J=3$
6.000	0.3003E-19	0.4417E-19	0.6162E-21	0.1742E-21
7.000	0.2712E-19	0.4493E-19	0.7634E-21	0.2493E-21
8.000	0.2481E-19	0.4531E-19	0.9163E-21	0.3384E-21
9.000	0.2293E-19	0.4539E-19	0.1074E-20	0.4413E-21
10.000	0.2136E-19	0.4527E-19	0.1234E-20	0.5577E-21
15.000	0.1617E-19	0.4308E-19	0.2045E-20	0.1326E-20
20.000	0.1323E-19	0.4001E-19	0.2819E-20	0.2326E-20
25.000	0.1128E-19	0.3701E-19	0.3519E-20	0.3433E-20
30.000	0.9889E-20	0.3428E-19	0.4133E-20	0.4540E-20
35.000	0.8840E-20	0.3187E-19	0.4657E-20	0.5556E-20
40.000	0.8014E-20	0.2974E-19	0.5095E-20	0.6431E-20
45.000	0.7349E-20	0.2790E-19	0.5454E-20	0.7149E-20
50.000	0.6796E-20	0.2625E-19	0.5759E-20	0.7687E-20

Table 24: Cross sections $\sigma_{22}(cm^2)$ $p\mu + t \rightarrow p\mu + t$.

ε_2(eV)	$J=0$	$J=1$	$J=2$	$J=3$
0.001	0.2254E-19			
0.002	0.2321E-19			
0.003	0.2373E-19			
0.004	0.2416E-19			
0.005	0.2455E-19			
0.006	0.2490E-19			
0.007	0.2522E-19			
0.008	0.2553E-19			
0.009	0.2581E-19			
0.010	0.2608E-19	0.4343E-22		
0.020	0.2829E-19	0.8519E-22		
0.030	0.3001E-19	0.1259E-21		
0.040	0.3148E-19	0.1656E-21		
0.050	0.3279E-19	0.2045E-21		
0.060	0.3398E-19	0.2427E-21		
0.070	0.3509E-19	0.2802E-21		
0.080	0.3612E-19	0.3171E-21		
0.090	0.3710E-19	0.3534E-21		
0.100	0.3802E-19	0.3890E-21	0.1574E-22	
0.120	0.3975E-19	0.4587E-21		
0.140	0.4134E-19	0.5262E-21		
0.160	0.4282E-19	0.5918E-21		
0.180	0.4421E-19	0.6554E-21		
0.200	0.4552E-19	0.7172E-21	0.3217E-22	
0.300	0.5118E-19	0.1001E-20	0.4908E-22	
0.400	0.5576E-19	0.1248E-20	0.6624E-22	
0.500	0.5959E-19	0.1463E-20	0.8348E-22	
0.600	0.6284E-19	0.1650E-20	0.1007E-21	
0.700	0.6565E-19	0.1813E-20	0.1180E-21	
0.800	0.6810E-19	0.1956E-20	0.1352E-21	
0.900	0.7024E-19	0.2080E-20	0.1525E-21	
1.000	0.7215E-19	0.2188E-20	0.1697E-21	0.2457E-22
1.200	0.7539E-19	0.2364E-20	0.2044E-21	0.2951E-22
1.400	0.7806E-19	0.2496E-20	0.2392E-21	0.3438E-22
1.600	0.8032E-19	0.2592E-20	0.2739E-21	0.3920E-22
1.800	0.8229E-19	0.2660E-20	0.3085E-21	0.4399E-22
2.000	0.8405E-19	0.2705E-20	0.3428E-21	0.4876E-22
3.000	0.9067E-19	0.2698E-20	0.5101E-21	0.7344E-22
4.000	0.9490E-19	0.2505E-20	0.6708E-21	0.9998E-22
5.000	0.9739E-19	0.2283E-20	0.8289E-21	0.1273E-21

Table 24: (continue) Cross sections $\sigma_{22}(\text{cm}^2)$ $p\mu + t \to p\mu + t$.

ε_2(eV)	$J = 0$	$J = 1$	$J = 2$	$J = 3$
6.000	0.9893E-19	0.2101E-20	0.9918E-21	0.1559E-21
7.000	0.9982E-19	0.1992E-20	0.1151E-20	0.1876E-21
8.000	0.1002E-18	0.1976E-20	0.1293E-20	0.2233E-21
9.000	0.1002E-18	0.2063E-20	0.1423E-20	0.2617E-21
10.000	0.9983E-19	0.2255E-20	0.1543E-20	0.3013E-21
15.000	0.9535E-19	0.4502E-20	0.1878E-20	0.5142E-21
20.000	0.8894E-19	0.8080E-20	0.1854E-20	0.6933E-21
25.000	0.8204E-19	0.1210E-19	0.1571E-20	0.8314E-21
30.000	0.7523E-19	0.1611E-19	0.1208E-20	0.8797E-21
35.000	0.6870E-19	0.1986E-19	0.8074E-21	0.8878E-21
40.000	0.6254E-19	0.2326E-19	0.4849E-21	0.8161E-21
45.000	0.5678E-19	0.2627E-19	0.2433E-21	0.7353E-21
50.000	0.5146E-19	0.2886E-19	0.1247E-21	0.6218E-21

Table 25.b: Total cross sections $\sigma_{ij}(\mathrm{cm}^2)$: $t\mu+p, p\mu+t$, above $p\mu-t$ threshold.

ε_2(eV)	σ_{11}	σ_{12}	σ_{21}	σ_{22}
0.001	0.1928E-18	0.1979E-22	0.3470E-17	0.2254E-19
0.002	0.1928E-18	0.2795E-22	0.2451E-17	0.2322E-19
0.003	0.1928E-18	0.3420E-22	0.1999E-17	0.2374E-19
0.004	0.1928E-18	0.3946E-22	0.1730E-17	0.2418E-19
0.005	0.1928E-18	0.4409E-22	0.1546E-17	0.2457E-19
0.006	0.1928E-18	0.4826E-22	0.1411E-17	0.2493E-19
0.007	0.1928E-18	0.5210E-22	0.1306E-17	0.2525E-19
0.008	0.1928E-18	0.5566E-22	0.1221E-17	0.2557E-19
0.009	0.1928E-18	0.5901E-22	0.1150E-17	0.2585E-19
0.010	0.1928E-18	0.6216E-22	0.1091E-17	0.2613E-19
0.020	0.1927E-18	0.8766E-22	0.7689E-18	0.2838E-19
0.030	0.1927E-18	0.1071E-21	0.6261E-18	0.3014E-19
0.040	0.1927E-18	0.1235E-21	0.5410E-18	0.3165E-19
0.050	0.1927E-18	0.1379E-21	0.4830E-18	0.3300E-19
0.060	0.1926E-18	0.1508E-21	0.4404E-18	0.3423E-19
0.070	0.1926E-18	0.1628E-21	0.4071E-18	0.3538E-19
0.080	0.1926E-18	0.1739E-21	0.3805E-18	0.3645E-19
0.090	0.1926E-18	0.1844E-21	0.3584E-18	0.3747E-19
0.100	0.1926E-18	0.1943E-21	0.3397E-18	0.3843E-19
0.120	0.1925E-18	0.2128E-21	0.3099E-18	0.4023E-19
0.140	0.1925E-18	0.2299E-21	0.2867E-18	0.4189E-19
0.160	0.1924E-18	0.2459E-21	0.2681E-18	0.4344E-19
0.180	0.1924E-18	0.2609E-21	0.2527E-18	0.4490E-19
0.200	0.1924E-18	0.2753E-21	0.2398E-18	0.4627E-19
0.300	0.1923E-18	0.3397E-21	0.1967E-18	0.5224E-19
0.400	0.1921E-18	0.3962E-21	0.1716E-18	0.5708E-19
0.500	0.1920E-18	0.4481E-21	0.1550E-18	0.6115E-19
0.600	0.1919E-18	0.4972E-21	0.1430E-18	0.6461E-19
0.700	0.1918E-18	0.5442E-21	0.1339E-18	0.6760E-19
0.800	0.1917E-18	0.5897E-21	0.1268E-18	0.7021E-19
0.900	0.1916E-18	0.6341E-21	0.1211E-18	0.7249E-19
1.000	0.1915E-18	0.6777E-21	0.1164E-18	0.7453E-19
1.200	0.1915E-18	0.7626E-21	0.1090E-18	0.7799E-19
1.400	0.1915E-18	0.8457E-21	0.1036E-18	0.8083E-19
1.600	0.1915E-18	0.9271E-21	0.9940E-19	0.8323E-19
1.800	0.1915E-18	0.1007E-20	0.9607E-19	0.8530E-19
2.000	0.1915E-18	0.1087E-20	0.9336E-19	0.8715E-19
3.000	0.1916E-18	0.1474E-20	0.8495E-19	0.9395E-19
4.000	0.1918E-18	0.1852E-20	0.8024E-19	0.9818E-19
5.000	0.1919E-18	0.2221E-20	0.7728E-19	0.1006E-18

Table 25.b: (continue) Total cross sections $\sigma_{ij}(\mathrm{cm}^2)$: $t\mu + p, p\mu + t$, above $p\mu - t$ threshold.

ε_2(eV)	σ_{11}	σ_{12}	σ_{21}	σ_{22}
6.000	0.1921E-18	0.2574E-20	0.7499E-19	0.1022E-18
7.000	0.1923E-18	0.2911E-20	0.7306E-19	0.1032E-18
8.000	0.1925E-18	0.3230E-20	0.7137E-19	0.1037E-18
9.000	0.1927E-18	0.3535E-20	0.6984E-19	0.1039E-18
10.000	0.1929E-18	0.3828E-20	0.6842E-19	0.1039E-18
15.000	0.1937E-18	0.5129E-20	0.6262E-19	0.1022E-18
20.000	0.1940E-18	0.6216E-20	0.5838E-19	0.9957E-19
25.000	0.1937E-18	0.7166E-20	0.5524E-19	0.9654E-19
30.000	0.1928E-18	0.8029E-20	0.5284E-19	0.9343E-19
35.000	0.1913E-18	0.8812E-20	0.5092E-19	0.9026E-19
40.000	0.1892E-18	0.9524E-20	0.4928E-19	0.8710E-19
45.000	0.1868E-18	0.1016E-19	0.4785E-19	0.8403E-19
50.000	0.1841E-18	0.1073E-19	0.4649E-19	0.8107E-19

Table 26: Cross sections $\sigma_{11}(\text{cm}^2)$ $t\mu + d \rightarrow t\mu + d$.

ε_1(eV)	$J=0$	$J=1$	$J=2$	$J=3$
0.001	0.1098E-18			
0.002	0.1122E-18			
0.003	0.1141E-18			
0.004	0.1157E-18			
0.005	0.1171E-18			
0.006	0.1183E-18			
0.007	0.1194E-18			
0.008	0.1205E-18			
0.009	0.1214E-18			
0.010	0.1223E-18	0.4933E-22		
0.020	0.1295E-18	0.3858E-21		
0.030	0.1348E-18	0.1056E-20		
0.040	0.1392E-18	0.2055E-20		
0.050	0.1429E-18	0.3349E-20		
0.060	0.1462E-18	0.4909E-20		
0.070	0.1492E-18	0.6704E-20		
0.080	0.1519E-18	0.8706E-20		
0.090	0.1544E-18	0.1089E-19		
0.100	0.1567E-18	0.1323E-19	0.4041E-22	
0.120	0.1609E-18	0.1832E-19	0.4835E-22	
0.140	0.1646E-18	0.2381E-19	0.5624E-22	
0.160	0.1680E-18	0.2960E-19	0.6489E-22	
0.180	0.1710E-18	0.3560E-19	0.7279E-22	
0.200	0.1738E-18	0.4173E-19	0.8140E-22	
0.300	0.1851E-18	0.7269E-19	0.1226E-21	
0.400	0.1934E-18	0.1018E-18	0.1643E-21	
0.500	0.1999E-18	0.1280E-18	0.2063E-21	
0.600	0.2052E-18	0.1511E-18	0.2488E-21	
0.700	0.2095E-18	0.1713E-18	0.2917E-21	
0.800	0.2131E-18	0.1890E-18	0.3345E-21	
0.900	0.2162E-18	0.2045E-18	0.3776E-21	
1.000	0.2188E-18	0.2182E-18	0.4210E-21	0.6408E-22
1.200	0.2230E-18	0.2408E-18	0.5087E-21	0.7665E-22
1.400	0.2261E-18	0.2588E-18	0.5973E-21	0.8897E-22
1.600	0.2283E-18	0.2732E-18	0.6869E-21	0.1011E-21
1.800	0.2299E-18	0.2847E-18	0.7775E-21	0.1133E-21
2.000	0.2309E-18	0.2942E-18	0.8690E-21	0.1257E-21
3.000	0.2312E-18	0.3212E-18	0.1336E-20	0.1954E-21
4.000	0.2267E-18	0.3314E-18	0.1842E-20	0.2811E-21
5.000	0.2200E-18	0.3339E-18	0.2357E-20	0.3773E-21

Table 26: (continue) Cross sections $\sigma_{11}(\text{cm}^2)$ $t\mu + d \rightarrow t\mu + d$.

ε_1(eV)	$J = 0$	$J = 1$	$J = 2$	$J = 3$
6.000	0.2121E-18	0.3326E-18	0.2903E-20	0.4828E-21
7.000	0.2036E-18	0.3291E-18	0.3468E-20	0.6037E-21
8.000	0.1950E-18	0.3244E-18	0.4050E-20	0.7475E-21
9.000	0.1863E-18	0.3190E-18	0.4657E-20	0.9217E-21
10.000	0.1778E-18	0.3131E-18	0.5267E-20	0.1136E-20
15.000	0.1390E-18	0.2820E-18	0.8600E-20	0.4026E-20
20.000	0.1076E-18	0.2522E-18	0.1236E-19	0.5339E-19
21.000				0.1624E-18
22.000				0.6352E-18
22.100				0.6701E-18
22.200				0.6791E-18
22.300				0.6608E-18
22.400				0.6199E-18
22.500				0.5648E-18
22.600				0.5041E-18
22.700				0.4441E-18
22.800				0.3887E-18
22.900				0.3396E-18
23.000				0.2970E-18
24.000				0.9963E-19
25.000	0.8299E-19	0.2252E-18	0.1661E-19	0.4942E-19
30.000	0.6374E-19	0.2011E-18	0.2140E-19	0.1106E-19
35.000	0.4873E-19	0.1796E-18	0.2679E-19	0.6864E-20
40.000	0.3705E-19	0.1605E-18	0.3293E-19	0.5844E-20
45.000	0.2796E-19	0.1436E-18	0.3999E-19	0.5655E-20
48.043	0.2436E-19			
48.044	0.2435E-19			
48.045	0.2435E-19			
48.046	0.2435E-19			
48.047	0.2435E-19			
48.048	0.2434E-19			
48.049	0.2434E-19			
48.050	0.2434E-19			
48.051	0.2434E-19			
48.052	0.2434E-19	0.1354E-18		
48.062	0.2432E-19	0.1353E-18		
48.072	0.2430E-19	0.1353E-18		
48.082	0.2428E-19	0.1353E-18		
48.092	0.2427E-19	0.1352E-18		
48.102	0.2425E-19	0.1352E-18		

Table 26: (continue) Cross sections $\sigma_{11}(\mathrm{cm}^2)$ $t\mu + d \rightarrow t\mu + d$.

ε_1(eV)	$J=0$	$J=1$	$J=2$	$J=3$
48.112	0.2423E-19	0.1352E-18		
48.122	0.2422E-19	0.1352E-18		
48.132	0.2420E-19	0.1351E-18		
48.142	0.2419E-19	0.1351E-18	0.4851E-19	
48.162	0.2416E-19	0.1350E-18	0.4851E-19	
48.182	0.2412E-19	0.1350E-18	0.4855E-19	
48.202	0.2409E-19	0.1349E-18	0.4859E-19	
48.222	0.2406E-19	0.1348E-18	0.4863E-19	
48.242	0.2403E-19	0.1348E-18	0.4867E-19	
48.342	0.2388E-19	0.1344E-18	0.4888E-19	
48.442	0.2374E-19	0.1341E-18	0.4909E-19	
48.542	0.2359E-19	0.1338E-18	0.4931E-19	
48.642	0.2345E-19	0.1334E-18	0.4953E-19	
48.742	0.2330E-19	0.1331E-18	0.4975E-19	
48.842	0.2316E-19	0.1328E-18	0.4998E-19	
48.942	0.2302E-19	0.1324E-18	0.5020E-19	
49.042	0.2288E-19	0.1321E-18	0.5043E-19	0.5391E-20
49.242	0.2261E-19	0.1316E-18		0.5402E-20
49.442	0.2234E-19	0.1309E-18		0.5413E-20
49.642	0.2207E-19	0.1302E-18		0.5424E-20
49.842	0.2180E-19	0.1295E-18		0.5436E-20
50.042	0.2154E-19	0.1288E-18	0.5261E-19	0.5448E-20
51.042	0.2027E-19	0.1254E-18	0.5474E-19	0.5537E-20
52.042	0.1907E-19	0.1222E-18	0.5681E-19	0.5597E-20
53.042	0.1794E-19	0.1191E-18	0.5856E-19	0.5657E-20
54.042	0.1686E-19	0.1161E-18	0.6014E-19	0.5710E-20
55.042	0.1584E-19	0.1132E-18	0.6132E-19	0.5777E-20
56.042	0.1488E-19	0.1104E-18	0.6225E-19	0.5850E-20
57.042	0.1396E-19	0.1077E-18	0.6285E-19	0.5933E-20
58.042	0.1309E-19	0.1051E-18	0.6314E-19	0.6003E-20
63.042	0.9363E-20	0.9305E-19	0.6154E-19	0.6416E-20
68.042	0.6537E-20	0.8254E-19	0.5714E-19	0.6813E-20
73.042	0.4402E-20	0.7324E-19	0.5236E-19	0.7186E-20
75.042	0.3709E-20			
76.042	0.3397E-20			
77.042	0.3104E-20			
78.042	0.2835E-20	0.6497E-19	0.4782E-19	0.7541E-20
83.042	0.1706E-20	0.5762E-19	0.4388E-19	0.7895E-20
88.042	0.9137E-21	0.5104E-19	0.4043E-19	0.8237E-20
93.042	0.4102E-21	0.4513E-19	0.3738E-19	0.8537E-20
98.042	0.1230E-21	0.3981E-19	0.3470E-19	0.8874E-20

Table 27: Cross sections $\sigma_{12}(\mathrm{cm}^2)$ $t\mu + d \rightarrow d\mu + t$.

ε_1(eV)	$J=0$	$J=1$	$J=2$	$J=3$
48.043	0.2871E-23			
48.044	0.4056E-23			
48.045	0.4963E-23			
48.046	0.5726E-23			
48.047	0.6397E-23			
48.048	0.7003E-23			
48.049	0.7559E-23			
48.050	0.8075E-23			
48.051	0.8559E-23			
48.052	0.9016E-23	0.2407E-24		
48.062	0.1268E-22	0.6800E-24		
48.072	0.1545E-22	0.1248E-23		
48.082	0.1775E-22	0.1919E-23		
48.092	0.1976E-22	0.2678E-23		
48.102	0.2157E-22	0.3480E-23		
48.112	0.2321E-22	0.4381E-23		
48.122	0.2472E-22	0.5346E-23		
48.132	0.2613E-22	0.6371E-23		
48.142	0.2745E-22	0.7451E-23	0.2110E-24	
48.162	0.2989E-22	0.9768E-23	0.3335E-24	
48.182	0.3210E-22	0.1227E-22	0.4898E-24	
48.202	0.3413E-22	0.1495E-22	0.6833E-24	
48.222	0.3601E-22	0.1779E-22	0.9164E-24	
48.242	0.3777E-22	0.2078E-22	0.1192E-23	
48.342	0.4526E-22	0.3759E-22	0.3268E-23	
48.442	0.5128E-22	0.5692E-22	0.6677E-23	
48.542	0.5636E-22	0.7820E-22	0.1161E-22	
48.642	0.6076E-22	0.1011E-21	0.1822E-22	
48.742	0.6465E-22	0.1252E-21	0.2666E-22	
48.842	0.6814E-22	0.1502E-21	0.3704E-22	
48.942	0.7130E-22	0.1760E-21	0.4947E-22	
49.042	0.7420E-22	0.2020E-21	0.6405E-22	0.4269E-26
49.242	0.7933E-22	0.2584E-21		0.8214E-26
49.442	0.8379E-22	0.3155E-21		0.1439E-25
49.642	0.8775E-22	0.3732E-21		0.2354E-25
49.842	0.9130E-22	0.4311E-21		0.3649E-25
50.042	0.9453E-22	0.4882E-21	0.3422E-21	0.5420E-25
51.042	0.1074E-21	0.7499E-21	0.8852E-21	0.2528E-24
52.042	0.1168E-21	0.9886E-21	0.1697E-20	0.7611E-24
53.042	0.1240E-21	0.1196E-20	0.2745E-20	0.1791E-23

Table 27: (continue) Cross sections $\sigma_{12}(\mathrm{cm}^2)$ $t\mu + d \rightarrow d\mu + t$.

ε_1(eV)	$J=0$	$J=1$	$J=2$	$J=3$
54.042	0.1295E-21	0.1376E-20	0.3994E-20	0.3615E-23
55.042	0.1340E-21	0.1529E-20	0.5378E-20	0.6515E-23
56.042	0.1378E-21	0.1659E-20	0.6856E-20	0.1082E-22
57.042	0.1408E-21	0.1770E-20	0.8370E-20	0.1689E-22
58.042	0.1432E-21	0.1864E-20	0.9874E-20	0.2501E-22
63.042	0.1507E-21	0.2150E-20	0.1640E-19	0.1091E-21
68.042	0.1536E-21	0.2248E-20	0.2045E-19	0.2901E-21
73.042	0.1542E-21	0.2247E-20	0.2252E-19	0.5870E-21
75.042	0.1539E-21			
76.042	0.1538E-21			
77.042	0.1536E-21			
78.042	0.1535E-21	0.2194E-20	0.2328E-19	0.9997E-21
83.042	0.1517E-21	0.2114E-20	0.2334E-19	0.1517E-20
88.042	0.1493E-21	0.2021E-20	0.2300E-19	0.2115E-20
93.042	0.1470E-21	0.1926E-20	0.2242E-19	0.2760E-20
98.042	0.1448E-21	0.1828E-20	0.2171E-19	0.3442E-20

Table 28: Cross sections $\sigma_{21}(\mathrm{cm}^2)$ $d\mu + t \rightarrow t\mu + d$.

ε_2(eV)	$J = 0$	$J = 1$	$J = 2$	$J = 3$
0.001	0.1352E-18			
0.002	0.9551E-19			
0.003	0.7792E-19			
0.004	0.6742E-19			
0.005	0.6026E-19			
0.006	0.5497E-19			
0.007	0.5086E-19			
0.008	0.4754E-19			
0.009	0.4479E-19			
0.010	0.4247E-19	0.1134E-20		
0.020	0.2986E-19	0.1602E-20		
0.030	0.2426E-19	0.1960E-20		
0.040	0.2092E-19	0.2261E-20		
0.050	0.1864E-19	0.2526E-20		
0.060	0.1695E-19	0.2755E-20		
0.070	0.1563E-19	0.2973E-20		
0.080	0.1458E-19	0.3175E-20		
0.090	0.1370E-19	0.3364E-20		
0.100	0.1296E-19	0.3542E-20	0.9936E-22	
0.120	0.1176E-19	0.3871E-20	0.1308E-21	
0.140	0.1083E-19	0.4171E-20	0.1647E-21	
0.160	0.1008E-19	0.4448E-20	0.2012E-21	
0.180	0.9457E-20	0.4706E-20	0.2400E-21	
0.200	0.8932E-20	0.4947E-20	0.2809E-21	
0.300	0.7150E-20	0.5977E-20	0.5150E-21	
0.400	0.6088E-20	0.6803E-20	0.7911E-21	
0.500	0.5364E-20	0.7494E-20	0.1103E-20	
0.600	0.4829E-20	0.8086E-20	0.1446E-20	
0.700	0.4414E-20	0.8599E-20	0.1817E-20	
0.800	0.4079E-20	0.9048E-20	0.2213E-20	
0.900	0.3801E-20	0.9440E-20	0.2633E-20	
1.000	0.3567E-20	0.9775E-20	0.3074E-20	0.2049E-24
1.200	0.3192E-20	0.1046E-19		0.3298E-24
1.400	0.2901E-20	0.1095E-19		0.4973E-24
1.600	0.2669E-20	0.1135E-19		0.7146E-24
1.800	0.2479E-20	0.1168E-19		0.9889E-24
2.000	0.2319E-20	0.1194E-19	0.8397E-20	0.1327E-23
3.000	0.1792E-20	0.1260E-19	0.1477E-19	0.4210E-23
4.000	0.1491E-20	0.1273E-19	0.2165E-19	0.9696E-23
5.000	0.1290E-20	0.1255E-19	0.2859E-19	0.1860E-22

Table 28: (continue) Cross sections $\sigma_{21}(\text{cm}^2)$ $d\mu + t \rightarrow t\mu + d$.

ε_2(eV)	$J = 0$	$J = 1$	$J = 2$	$J = 3$
6.000	0.1145E-20	0.1226E-19	0.3527E-19	0.3172E-22
7.000	0.1034E-20	0.1190E-19	0.4152E-19	0.4994E-22
8.000	0.9470E-21	0.1150E-19	0.4713E-19	0.7393E-22
9.000	0.8755E-21	0.1109E-19	0.5209E-19	0.1044E-21
10.000	0.8155E-21	0.1071E-19	0.5628E-19	0.1418E-21
15.000	0.6218E-21	0.8940E-20	0.6768E-19	0.4481E-21
20.000	0.5135E-21	0.7566E-20	0.6846E-19	0.9672E-21
25.000	0.4428E-21	0.6492E-20	0.6473E-19	0.1684E-20
27.000	0.4205E-21			
28.000	0.4106E-21			
29.000	0.4012E-21			
30.000	0.3925E-21	0.5649E-20	0.5971E-19	0.2560E-20
35.000	0.3540E-21	0.4961E-20	0.5459E-19	0.3545E-20
40.000	0.3233E-21	0.4407E-20	0.4988E-19	0.4576E-20
45.000	0.2991E-21	0.3945E-20	0.4563E-19	0.5630E-20
50.000	0.2795E-21	0.3552E-20	0.4195E-19	0.6658E-20

Table 29: Cross sections $\sigma_{22}(\text{cm}^2)$ $d\mu + t \rightarrow d\mu + t$.

ε_2(eV)	$J=0$	$J=1$	$J=2$	$J=3$
0.001	0.1558E-19			
0.002	0.1663E-19			
0.003	0.1746E-19			
0.004	0.1816E-19			
0.005	0.1878E-19			
0.006	0.1935E-19			
0.007	0.1988E-19			
0.008	0.2037E-19			
0.009	0.2084E-19			
0.010	0.2129E-19	0.1221E-21		
0.020	0.2496E-19	0.2341E-21		
0.030	0.2786E-19	0.3389E-21		
0.040	0.3036E-19	0.4376E-21		
0.050	0.3259E-19	0.5308E-21		
0.060	0.3462E-19	0.6345E-21		
0.070	0.3650E-19	0.7149E-21		
0.080	0.3826E-19	0.7913E-21		
0.090	0.3991E-19	0.8636E-21		
0.100	0.4148E-19	0.9318E-21	0.4569E-22	
0.120	0.4439E-19	0.1045E-20	0.5573E-22	
0.140	0.4705E-19	0.1155E-20	0.6527E-22	
0.160	0.4951E-19	0.1252E-20	0.7485E-22	
0.180	0.5180E-19	0.1337E-20	0.8430E-22	
0.200	0.5395E-19	0.1410E-20	0.9370E-22	
0.300	0.6302E-19	0.1666E-20	0.1411E-21	
0.400	0.7020E-19	0.1795E-20	0.1886E-21	
0.500	0.7615E-19	0.1831E-20	0.2362E-21	
0.600	0.8124E-19	0.1812E-20	0.2839E-21	
0.700	0.8570E-19	0.1749E-20	0.3318E-21	
0.800	0.8966E-19	0.1657E-20	0.3798E-21	
0.900	0.9322E-19	0.1552E-20	0.4278E-21	
1.000	0.9646E-19	0.1444E-20	0.4759E-21	0.7170E-22
1.200	0.1021E-18	0.1103E-20		0.8602E-22
1.400	0.1069E-18	0.8180E-21		0.1003E-21
1.600	0.1109E-18	0.5631E-21		0.1147E-21
1.800	0.1144E-18	0.3519E-21		0.1290E-21
2.000	0.1174E-18	0.1931E-21	0.9512E-21	0.1434E-21
3.000	0.1277E-18	0.3464E-21	0.1411E-20	0.2168E-21
4.000	0.1331E-18	0.2057E-20	0.1865E-20	0.2897E-21
5.000	0.1357E-18	0.5029E-20	0.2315E-20	0.3636E-21

Table 29: (continue) Cross sections $\sigma_{22}(\mathrm{cm}^2)$ $d\mu + t \rightarrow d\mu + t$.

ε_2(eV)	$J = 0$	$J = 1$	$J = 2$	$J = 3$
6.000	0.1364E-18	0.8909E-20	0.2765E-20	0.4310E-21
7.000	0.1359E-18	0.1339E-19	0.3225E-20	0.5098E-21
8.000	0.1346E-18	0.1824E-19	0.3701E-20	0.5875E-21
9.000	0.1326E-18	0.2328E-19	0.4210E-20	0.6578E-21
10.000	0.1302E-18	0.2839E-19	0.4752E-20	0.7269E-21
15.000	0.1151E-18	0.5233E-19	0.8166E-20	0.9721E-21
20.000	0.9878E-19	0.7119E-19	0.1252E-19	0.1075E-20
25.000	0.8353E-19	0.8461E-19	0.1730E-19	0.1031E-20
27.000	0.7789E-19			
28.000	0.7517E-19			
29.000	0.7252E-19			
30.000	0.6995E-19	0.9352E-19	0.2198E-19	0.8938E-21
35.000	0.5815E-19	0.9858E-19	0.2636E-19	0.7103E-21
40.000	0.4802E-19	0.1009E-18	0.3034E-19	0.5189E-21
45.000	0.3942E-19	0.1011E-18	0.3376E-19	0.3620E-21
50.000	0.3216E-19	0.9953E-19	0.3671E-19	0.2652E-21

Table 30.a: Total cross sections $\sigma_{11}(\text{cm}^2)$: $t\mu + d \rightarrow t\mu + d$, below $d\mu - t$ threshold.

ε_1(eV)	σ_{11}
0.001	0.1098E-18
0.002	0.1122E-18
0.003	0.1141E-18
0.004	0.1157E-18
0.005	0.1171E-18
0.006	0.1183E-18
0.007	0.1194E-18
0.008	0.1205E-18
0.009	0.1214E-18
0.010	0.1224E-18
0.020	0.1299E-18
0.030	0.1359E-18
0.040	0.1413E-18
0.050	0.1463E-18
0.060	0.1511E-18
0.070	0.1559E-18
0.080	0.1606E-18
0.090	0.1653E-18
0.100	0.1700E-18
0.120	0.1793E-18
0.140	0.1885E-18
0.160	0.1977E-18
0.180	0.2067E-18
0.200	0.2156E-18
0.300	0.2579E-18
0.400	0.2954E-18
0.500	0.3281E-18
0.600	0.3566E-18
0.700	0.3811E-18
0.800	0.4025E-18
0.900	0.4211E-18
1.000	0.4375E-18
1.200	0.4644E-18
1.400	0.4856E-18
1.600	0.5023E-18
1.800	0.5155E-18
2.000	0.5261E-18
3.000	0.5539E-18
4.000	0.5602E-18
5.000	0.5566E-18

Table 30.a: (continue) Total cross sections $\sigma_{11}(\text{cm}^2)$: $t\mu + d \rightarrow t\mu + d$, below $d\mu - t$ threshold.

ε_1(eV)	σ_{11}
6.000	0.5481E-18
7.000	0.5368E-18
8.000	0.5242E-18
9.000	0.5109E-18
10.000	0.4973E-18
15.000	0.4336E-18
20.000	0.4256E-18
21.000	0.5251E-18
22.000	0.9884E-18
22.100	0.1022E-17
22.200	0.1030E-17
22.300	0.1011E-17
22.400	0.9693E-18
22.500	0.9133E-18
22.600	0.8516E-18
22.700	0.7907E-18
22.800	0.7343E-18
22.900	0.6843E-18
23.000	0.6407E-18
24.000	0.4339E-18
25.000	0.3742E-18
30.000	0.2973E-18
35.000	0.2620E-18
40.000	0.2363E-18
45.000	0.2172E-18

Table 30.b: Total cross sections $\sigma_{ij}(\text{cm}^2)$: $t\mu+d, d\mu+t$, above $d\mu-t$ threshold.

ε_2(eV)	σ_{11}	σ_{12}	σ_{21}	σ_{22}
0.001	0.2137E-18	0.2897E-23	0.1353E-18	0.1559E-19
0.002	0.2137E-18	0.4108E-23	0.9574E-19	0.1666E-19
0.003	0.2137E-18	0.5042E-23	0.7826E-19	0.1750E-19
0.004	0.2137E-18	0.5831E-23	0.6788E-19	0.1821E-19
0.005	0.2137E-18	0.6528E-23	0.6083E-19	0.1884E-19
0.006	0.2136E-18	0.7160E-23	0.5566E-19	0.1943E-19
0.007	0.2136E-18	0.7742E-23	0.5166E-19	0.1997E-19
0.008	0.2136E-18	0.8284E-23	0.4846E-19	0.2047E-19
0.009	0.2136E-18	0.8795E-23	0.4582E-19	0.2095E-19
0.010	0.2136E-18	0.9278E-23	0.4361E-19	0.2142E-19
0.020	0.2135E-18	0.1340E-22	0.3148E-19	0.2520E-19
0.030	0.2135E-18	0.1676E-22	0.2625E-19	0.2821E-19
0.040	0.2135E-18	0.1975E-22	0.2322E-19	0.3082E-19
0.050	0.2134E-18	0.2254E-22	0.2122E-19	0.3315E-19
0.060	0.2134E-18	0.2518E-22	0.1976E-19	0.3529E-19
0.070	0.2133E-18	0.2774E-22	0.1867E-19	0.3725E-19
0.080	0.2133E-18	0.3024E-22	0.1783E-19	0.3909E-19
0.090	0.2132E-18	0.3269E-22	0.1715E-19	0.4082E-19
0.100	0.2132E-18	0.3511E-22	0.1660E-19	0.4246E-19
0.120	0.2131E-18	0.3999E-22	0.1576E-19	0.4550E-19
0.140	0.2131E-18	0.4486E-22	0.1517E-19	0.4828E-19
0.160	0.2130E-18	0.4976E-22	0.1473E-19	0.5085E-19
0.180	0.2129E-18	0.5472E-22	0.1440E-19	0.5323E-19
0.200	0.2129E-18	0.5974E-22	0.1416E-19	0.5547E-19
0.300	0.2126E-18	0.8612E-22	0.1364E-19	0.6485E-19
0.400	0.2123E-18	0.1149E-21	0.1368E-19	0.7221E-19
0.500	0.2121E-18	0.1462E-21	0.1396E-19	0.7825E-19
0.600	0.2118E-18	0.1801E-21	0.1436E-19	0.8338E-19
0.700	0.2115E-18	0.2165E-21	0.1483E-19	0.8783E-19
0.800	0.2113E-18	0.2554E-21	0.1534E-19	0.9175E-19
0.900	0.2110E-18	0.2968E-21	0.1587E-19	0.9526E-19
1.000	0.2108E-18	0.3403E-21	0.1642E-19	0.9845E-19
1.200	0.2122E-18	0.4574E-21	0.1779E-19	0.1039E-18
1.400	0.2113E-18	0.5746E-21	0.1905E-19	0.1085E-18
1.600	0.2103E-18	0.6919E-21	0.2029E-19	0.1123E-18
1.800	0.2093E-18	0.8090E-21	0.2149E-19	0.1157E-18
2.000	0.2084E-18	0.9250E-21	0.2266E-19	0.1187E-18
3.000	0.2059E-18	0.1743E-20	0.2917E-19	0.1297E-18
4.000	0.2037E-18	0.2803E-20	0.3588E-19	0.1373E-18
5.000	0.2013E-18	0.4067E-20	0.4245E-19	0.1434E-18

Table 30.b: (continue) Total cross sections $\sigma_{ij}(\mathrm{cm}^2)$: $t\mu + d, d\mu + t$, above $d\mu - t$ threshold.

ε_2(eV)	σ_{11}	σ_{12}	σ_{21}	σ_{22}
6.000	0.1988E-18	0.5503E-20	0.4871E-19	0.1485E-18
7.000	0.1961E-18	0.7048E-20	0.5450E-19	0.1530E-18
8.000	0.1934E-18	0.8664E-20	0.5965E-19	0.1571E-18
9.000	0.1904E-18	0.1030E-19	0.6416E-19	0.1607E-18
10.000	0.1873E-18	0.1191E-19	0.6795E-19	0.1641E-18
15.000	0.1704E-18	0.1881E-19	0.7769E-19	0.1766E-18
20.000	0.1530E-18	0.2314E-19	0.7751E-19	0.1836E-18
25.000	0.1372E-18	0.2551E-19	0.7335E-19	0.1865E-18
27.000	0.1240E-18	0.2596E-19	0.7133E-19	0.1862E-18
28.000	0.1237E-18	0.2618E-19	0.7032E-19	0.1862E-18
29.000	0.1234E-18	0.2640E-19	0.6932E-19	0.1862E-18
30.000	0.1232E-18	0.2663E-19	0.6831E-19	0.1863E-18
35.000	0.1111E-18	0.2712E-19	0.6345E-19	0.1838E-18
40.000	0.1006E-18	0.2729E-19	0.5919E-19	0.1798E-18
45.000	0.9146E-19	0.2725E-19	0.5550E-19	0.1746E-18
50.000	0.8351E-19	0.2712E-19	0.5244E-19	0.1687E-18

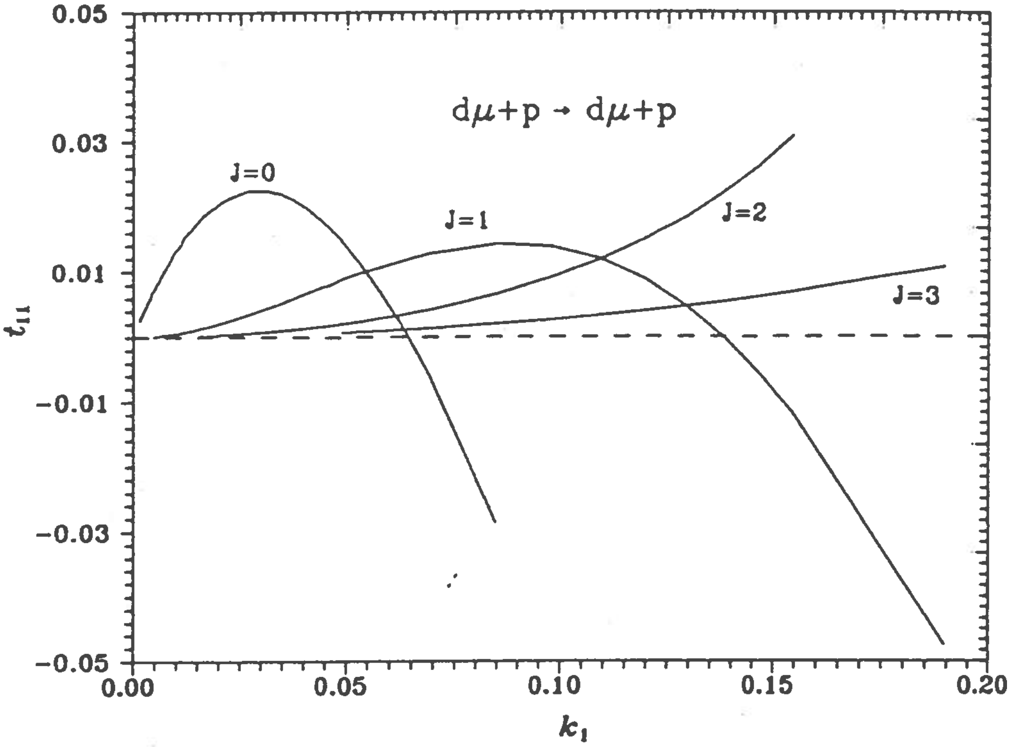

dμ+p → dμ+p
J=0
J=1
J=2
J=3
0.05
0.03
0.01
−0.01
−0.03
−0.05
0.00
0.05
0.10
0.15
0.20
t_{11}
k_1

Fig. 1

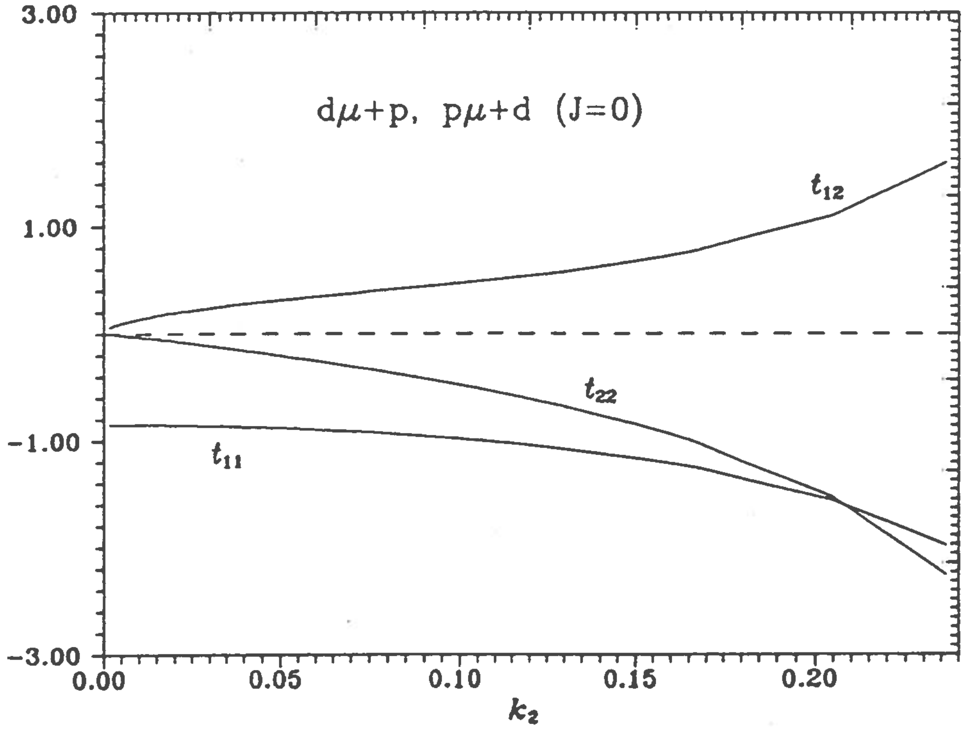

dμ+p, pμ+d (J=0)
t_{12}
t_{22}
t_{11}
3.00
1.00
-1.00
−3.00
0.00
0.05
0.10
0.15
0.20
k_2

Fig. 2

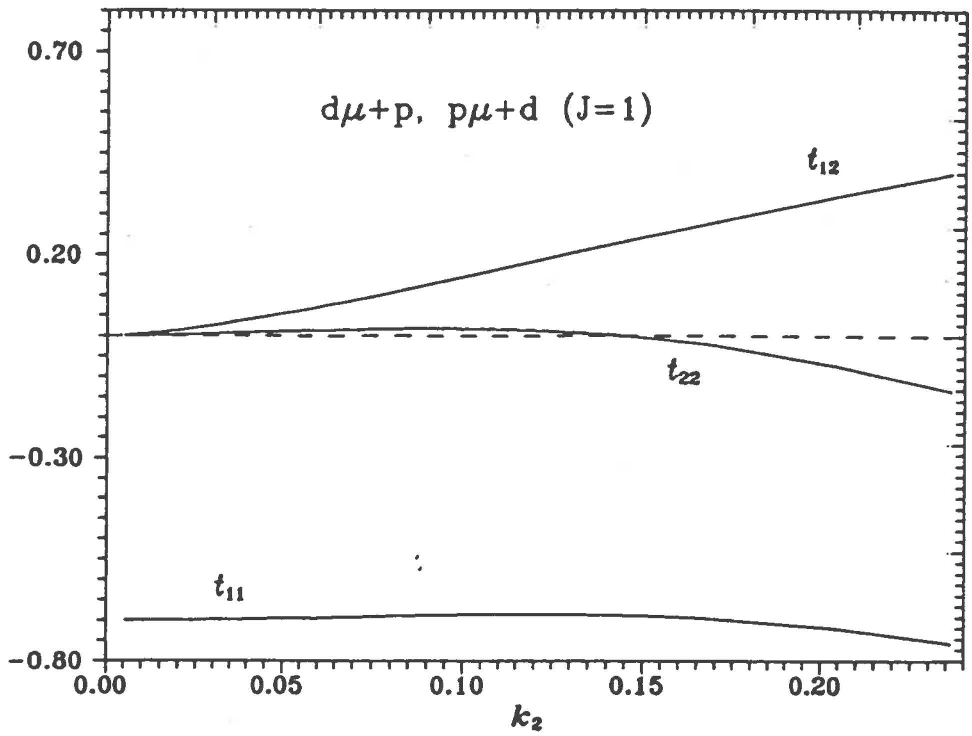

0.70
0.20
−0.30
−0.80
dμ+p, pμ+d (J=1)
t_{12}
t_{22}
t_{11}
0.00
0.05
0.10
0.15
0.20
k_2

Fig. 3

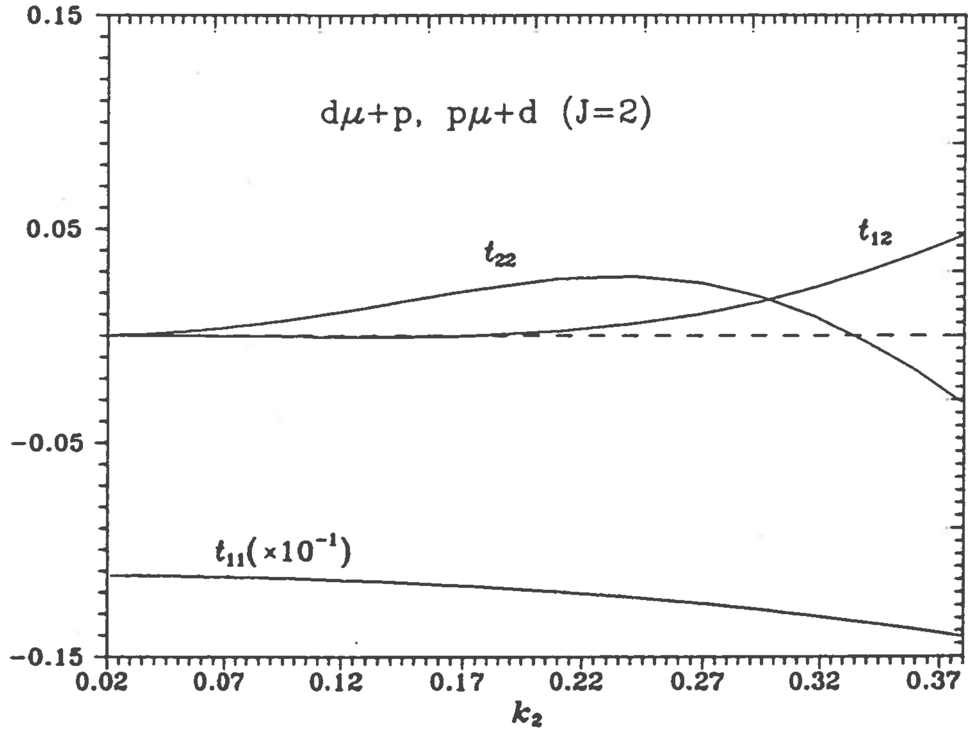

0.15
0.05
−0.05
−0.15
dμ+p, pμ+d (J=2)
t_{22}
t_{12}
$t_{11}(\times 10^{-1})$
0.02
0.07
0.12
0.17
0.22
0.27
0.32
0.37
k_2

Fig. 4

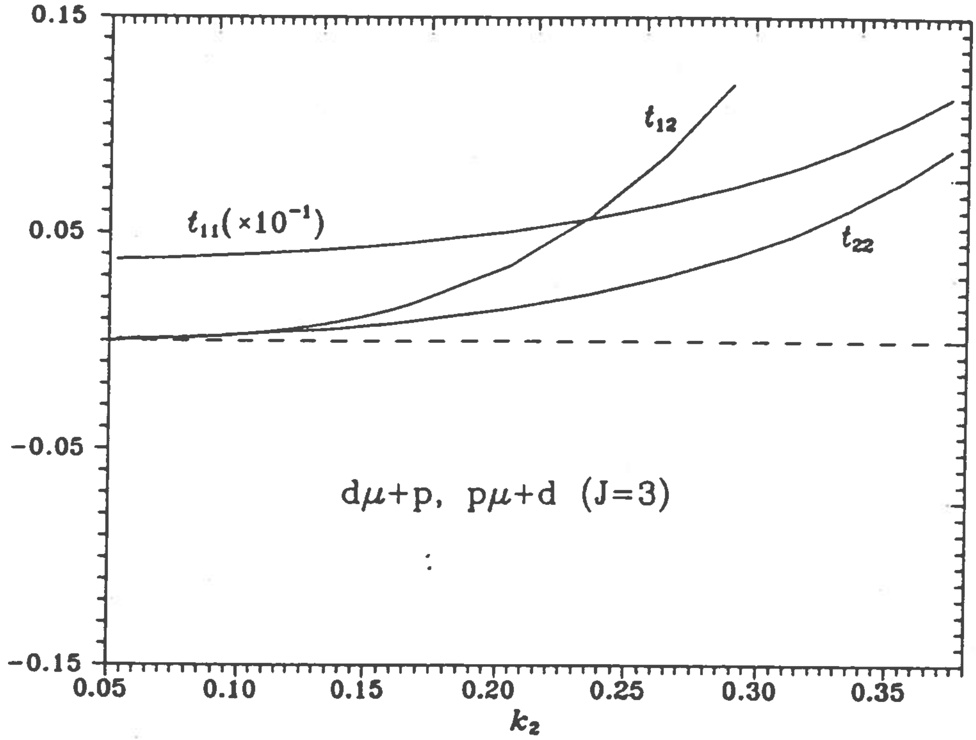

0.15
0.05
−0.05
−0.15
0.05
0.10
0.15
0.20
0.25
0.30
0.35
k_2
t_{12}
$t_{11}(\times 10^{-1})$
t_{22}
dμ+p, pμ+d (J=3)

Fig. 5

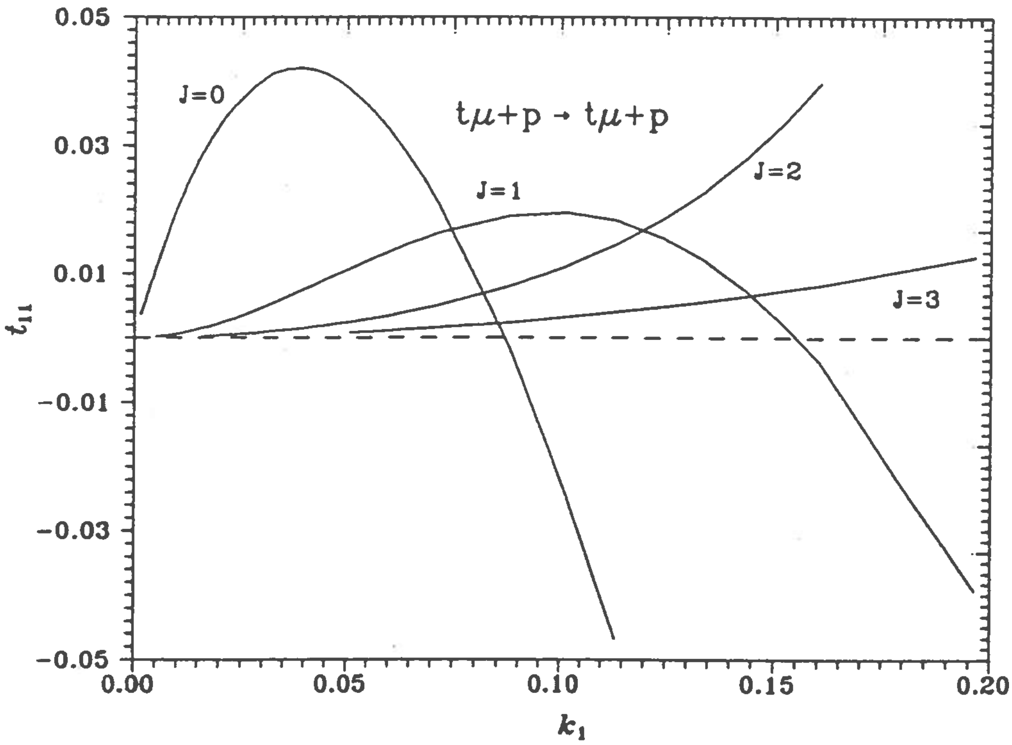

0.05
0.03
0.01
−0.01
−0.03
−0.05
0.00
0.05
0.10
0.15
0.20
t_{11}
k_1
J=0
J=1
J=2
J=3
tμ+p → tμ+p

Fig. 6

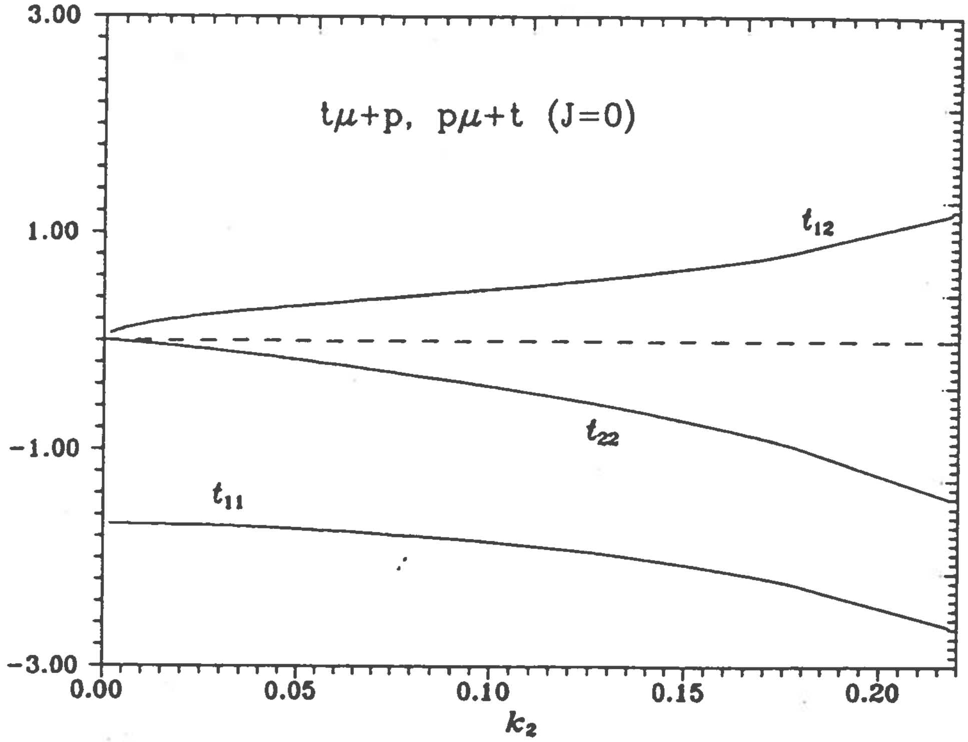

tμ+p, pμ+t (J=0)
t_{12}
t_{22}
t_{11}
3.00
1.00
−1.00
−3.00
0.00
0.05
0.10
0.15
0.20
k_2

Fig. 7

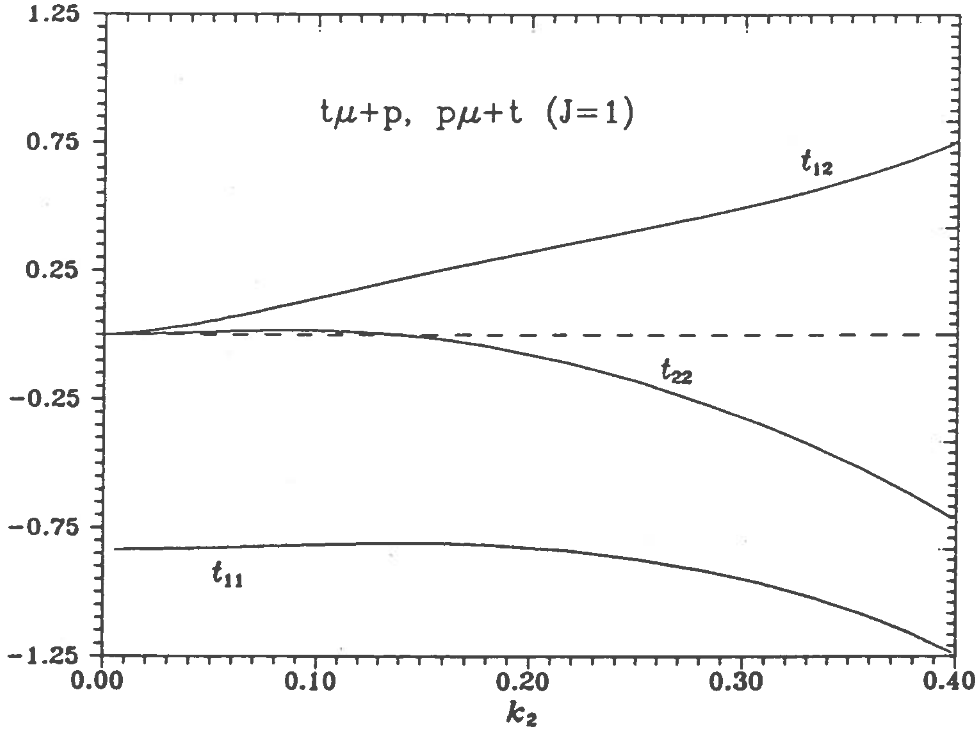

tμ+p, pμ+t (J=1)
t_{12}
t_{22}
t_{11}
1.25
0.75
0.25
−0.25
−0.75
−1.25
0.00
0.10
0.20
0.30
0.40
k_2

Fig. 8

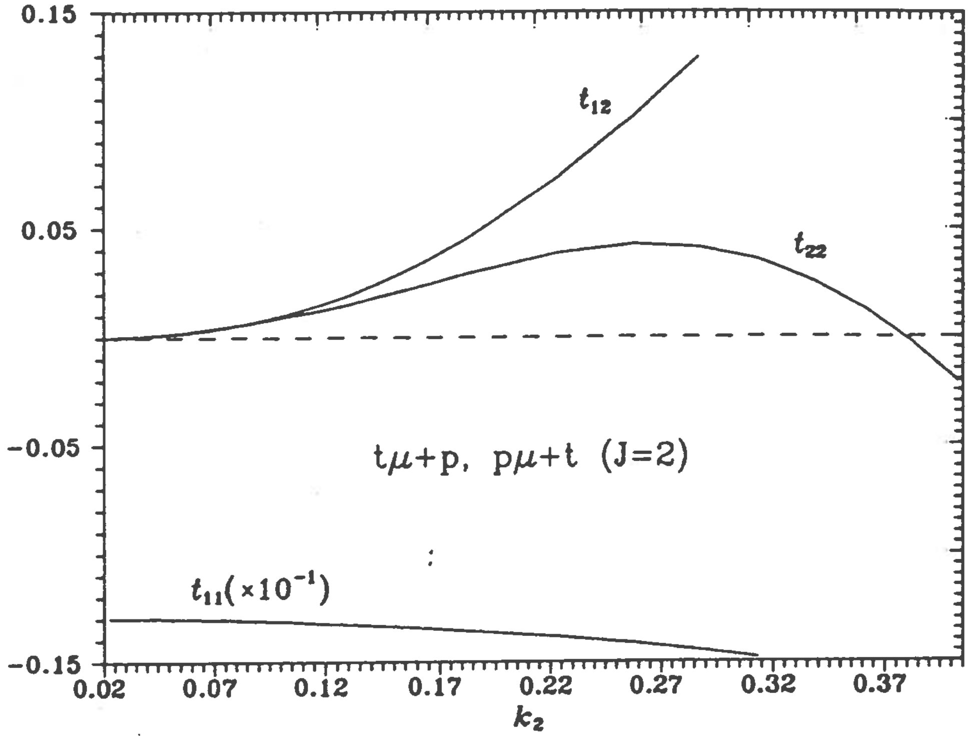

0.15
0.05
−0.05
−0.15
0.02
0.07
0.12
0.17
0.22
0.27
0.32
0.37
k_2
t_{12}
t_{22}
$t\mu+p,\ p\mu+t\ (J=2)$
$t_{11}(\times 10^{-1})$

Fig. 9

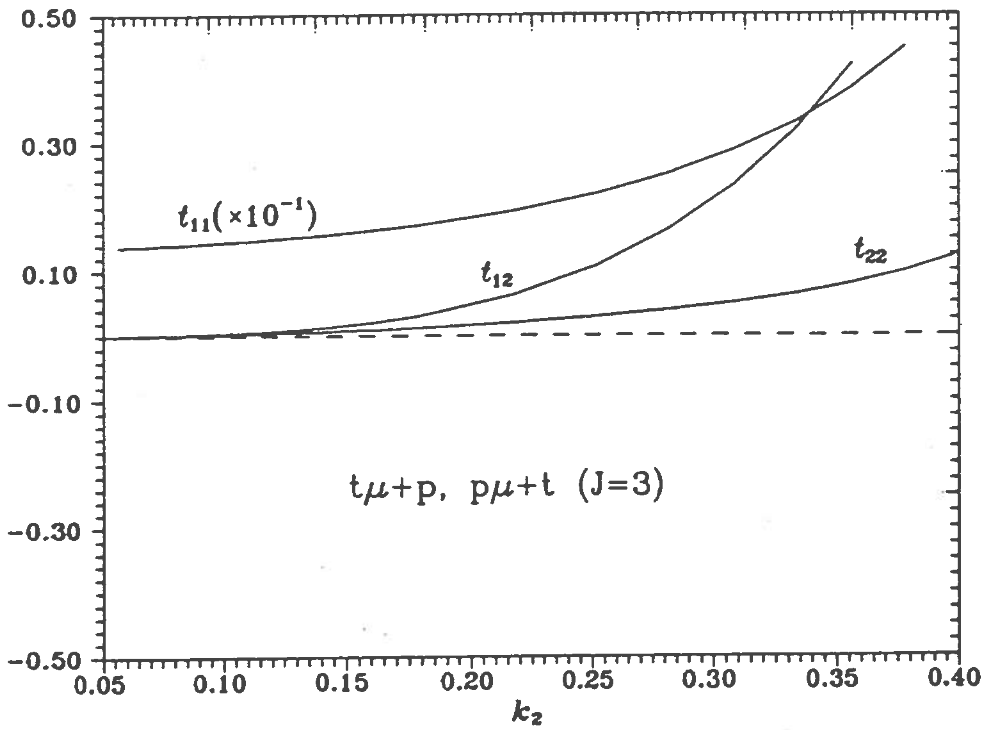
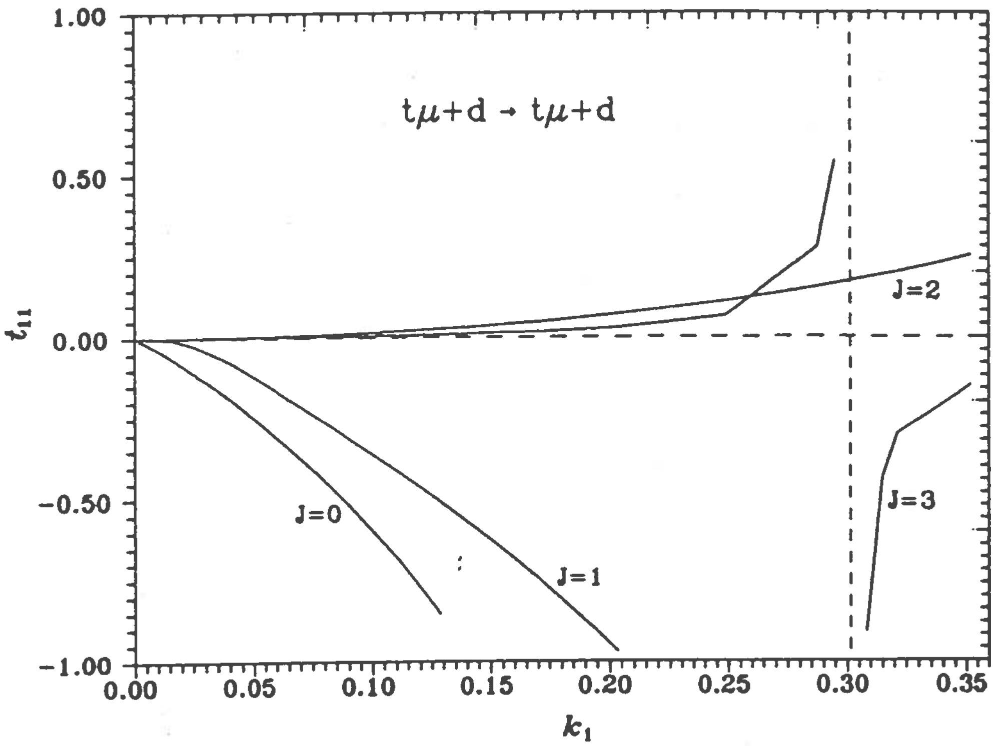
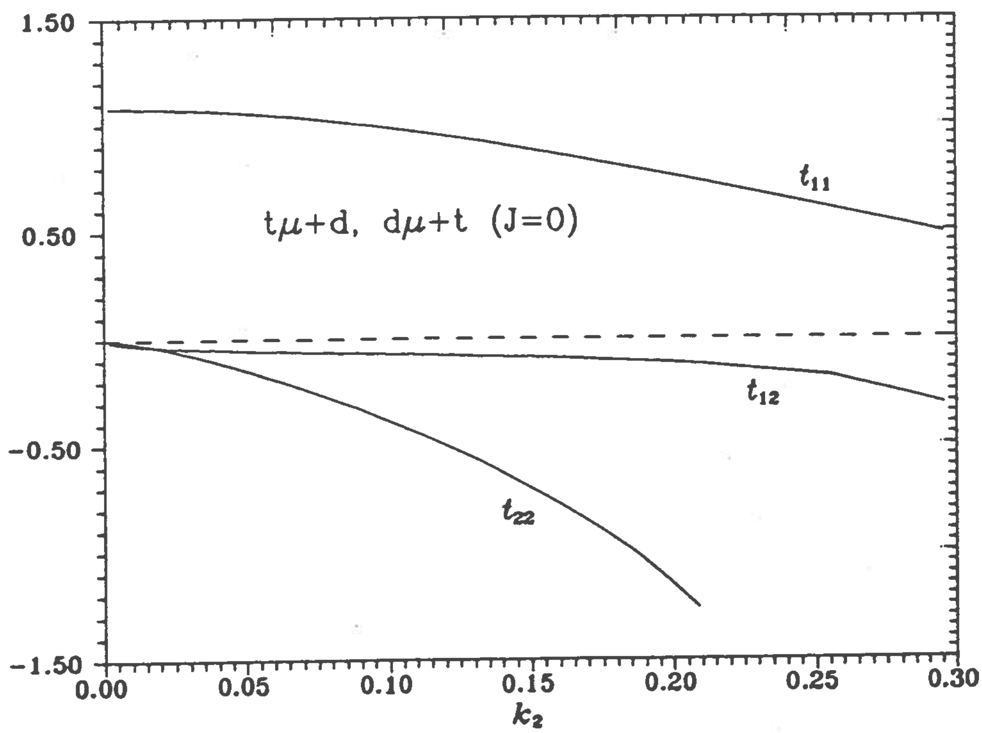

0.50
0.30
0.10
−0.10
−0.30
−0.50
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.40
k_2
$t_{11}(\times 10^{-1})$
t_{12}
t_{22}
$t\mu+p,\ p\mu+t\ (J=3)$

Fig. 10



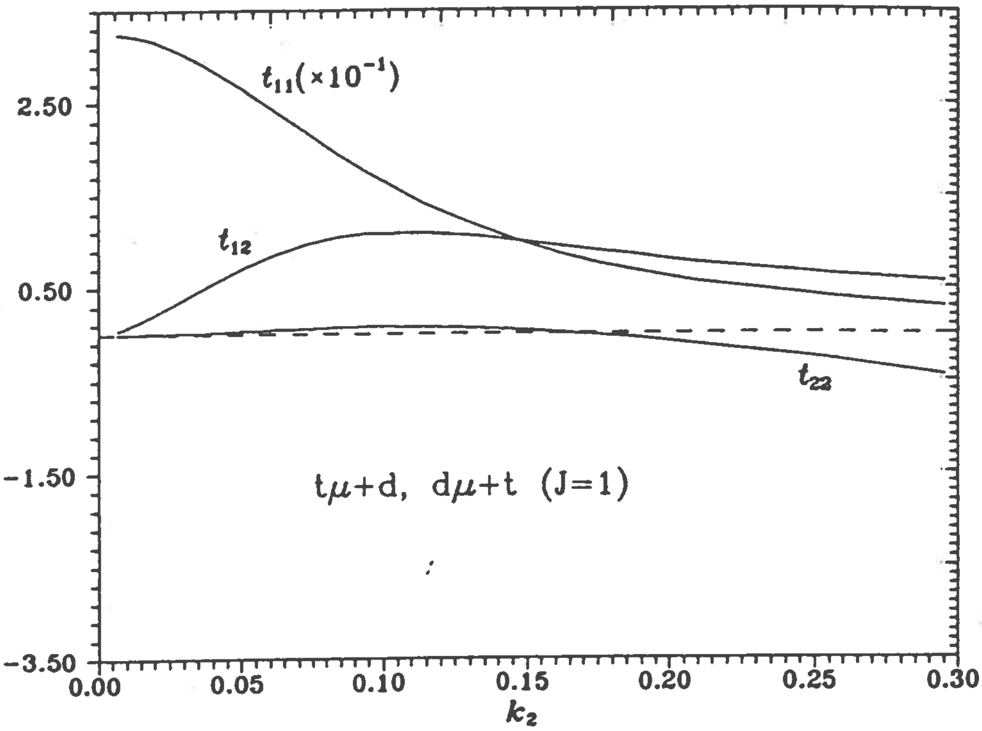
tμ+d → tμ+d
J=0
J=1
J=2
J=3
t_{11}
k_1
1.00
0.50
0.00
−0.50
−1.00
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35

Fig. 11



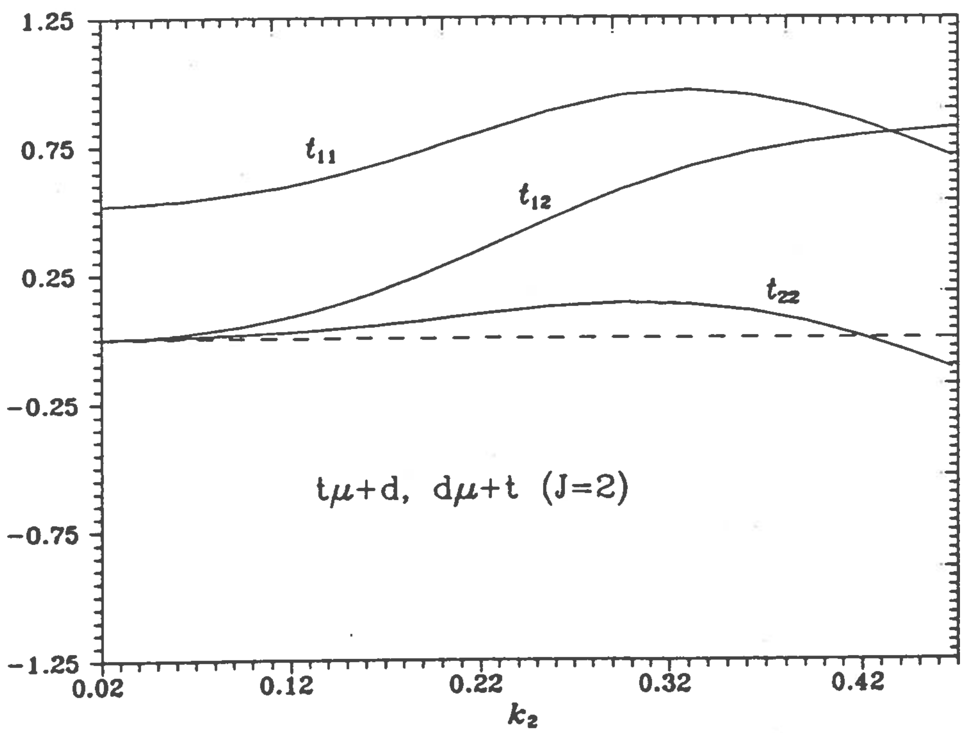
tμ+d, dμ+t (J=0)
t_{11}
t_{12}
t_{22}
k_2
1.50
0.50
−0.50
−1.50
0.00
0.05
0.10
0.15
0.20
0.25
0.30

Fig. 12



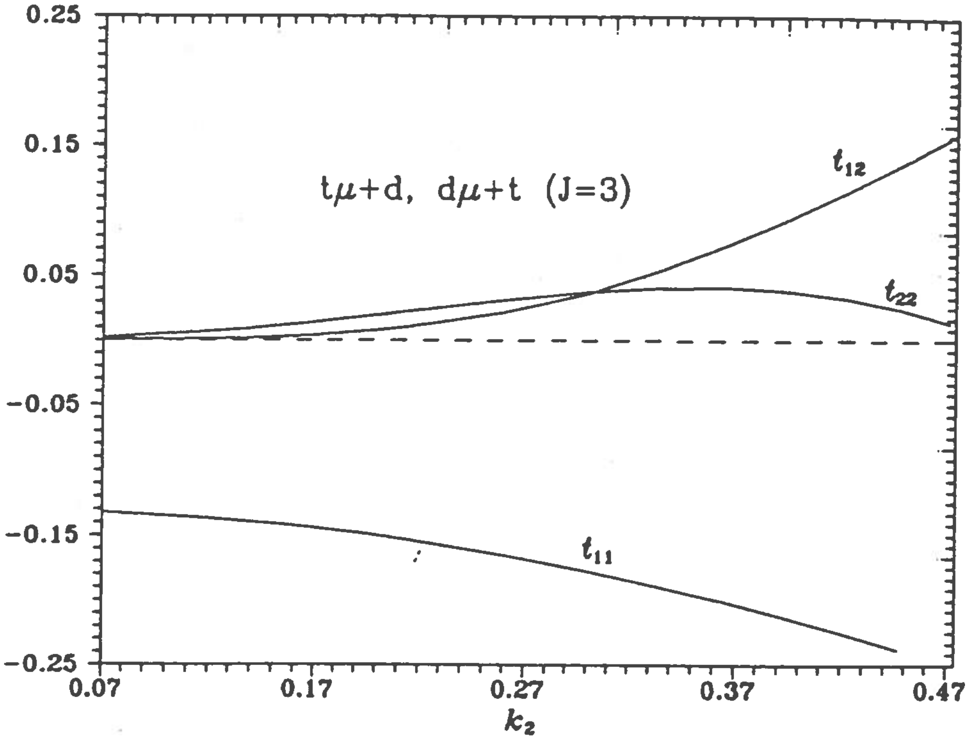
t11(×10^-1)
t12
t22
tμ+d, dμ+t (J=1)
2.50
0.50
−1.50
−3.50
0.00
0.05
0.10
0.15
0.20
0.25
0.30
k2

Fig. 13



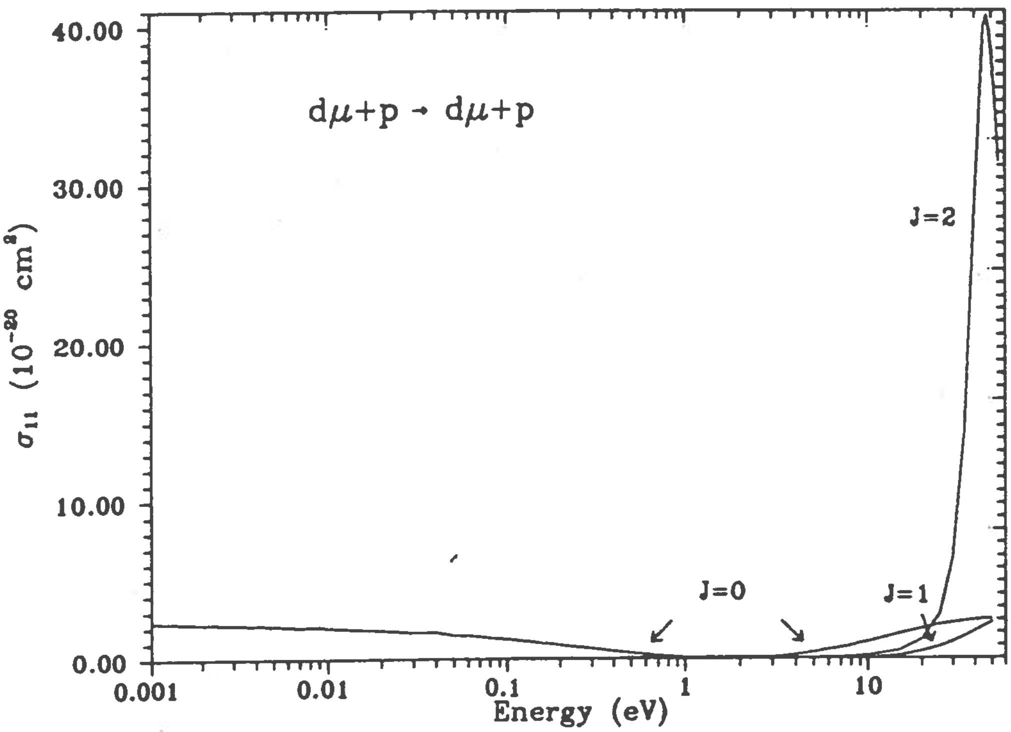
t11
t12
t22
tμ+d, dμ+t (J=2)
1.25
0.75
0.25
−0.25
−0.75
−1.25
0.02
0.12
0.22
0.32
0.42
k2

Fig. 14



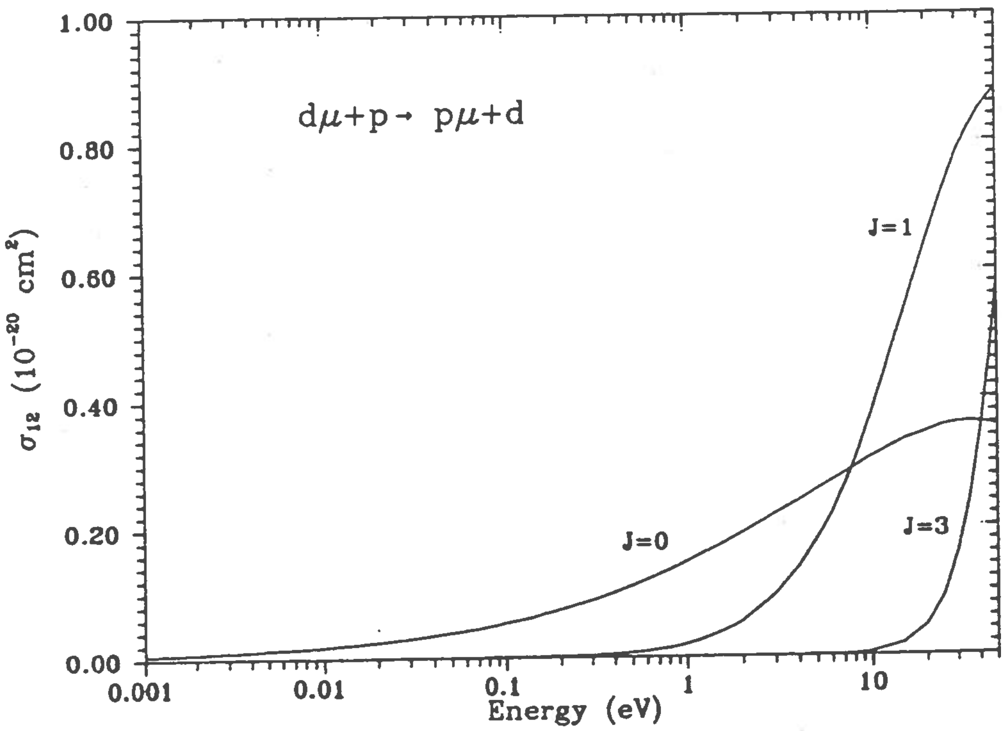
0.25
0.15
0.05
−0.05
−0.15
−0.25
0.07
0.17
0.27
0.37
0.47
k_2
tμ+d, dμ+t (J=3)
t_{12}
t_{22}
t_{11}

Fig. 15



dμ+p → dμ+p
J=2
J=0
J=1
σ11 (10^-20 cm^2)
40.00
30.00
20.00
10.00
0.00
0.001
0.01
0.1
1
10
Energy (eV)

Fig. 16



dμ+p → pμ+d
J=1
J=0
J=3
σ12 (10^-20 cm^2)
1.00
0.80
0.60
0.40
0.20
0.00
0.001
0.01
0.1
1
10
Energy (eV)

Fig. 17

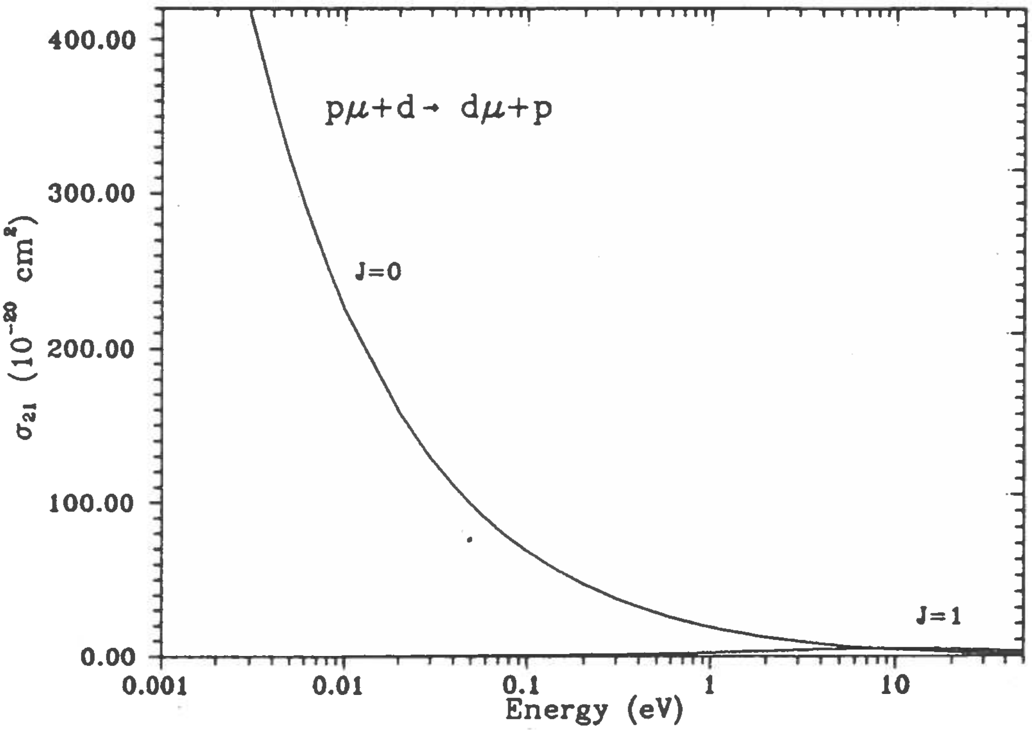

400.00
300.00
200.00
100.00
0.00
σ_{21} (10^{-20} cm^2)
pμ+d → dμ+p
J=0
J=1
0.001
0.01
0.1
1
10
Energy (eV)

Fig. 18

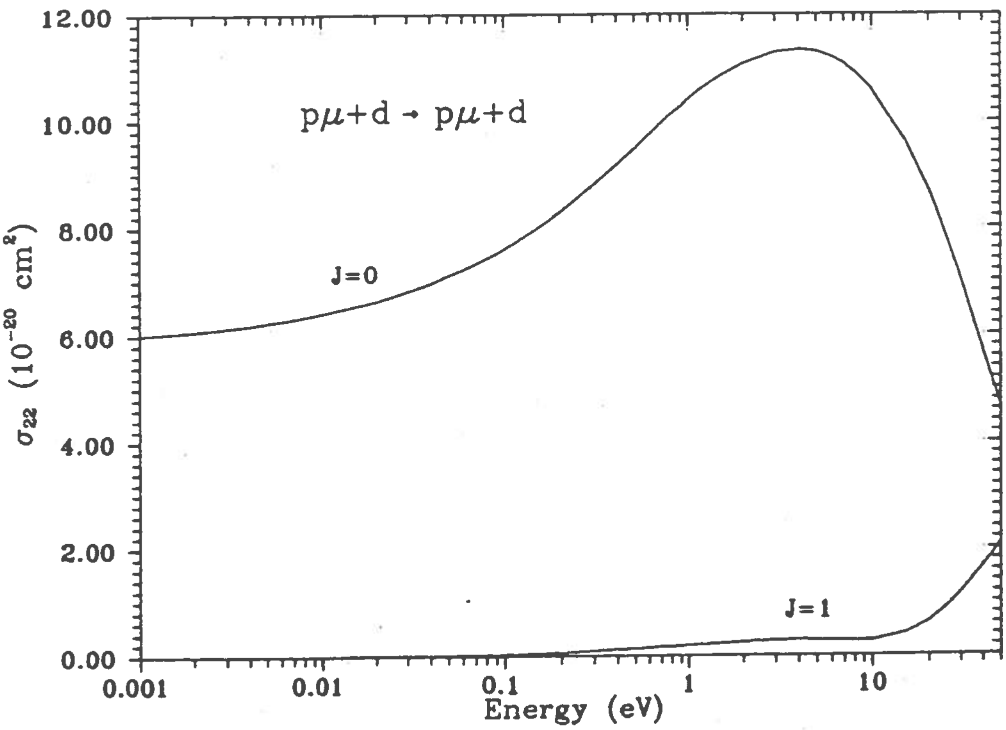

12.00
10.00
8.00
6.00
4.00
2.00
0.00
σ_{22} (10^{-20} cm^2)
pμ+d → pμ+d
J=0
J=1
0.001
0.01
0.1
1
10
Energy (eV)

Fig. 19

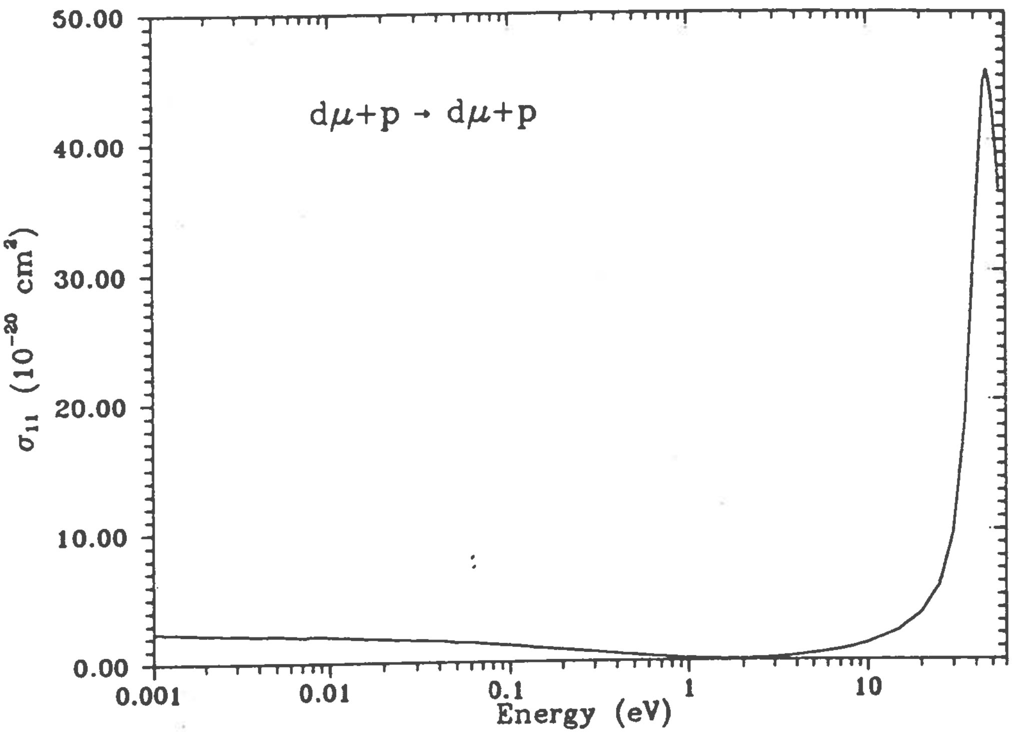


Fig. 20.a

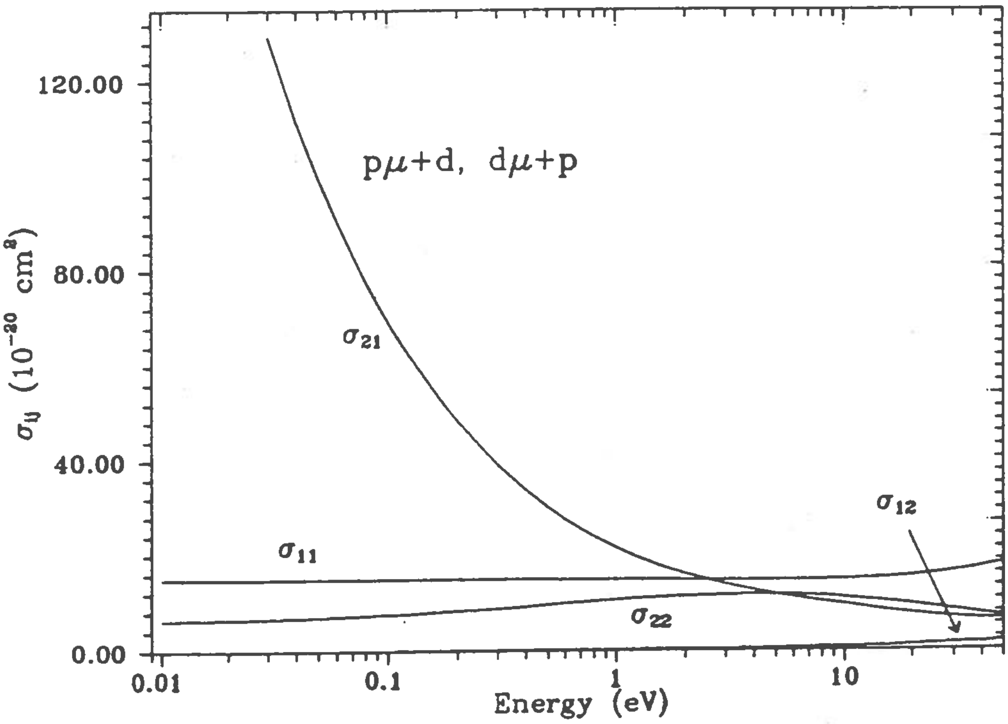


Fig. 20.b

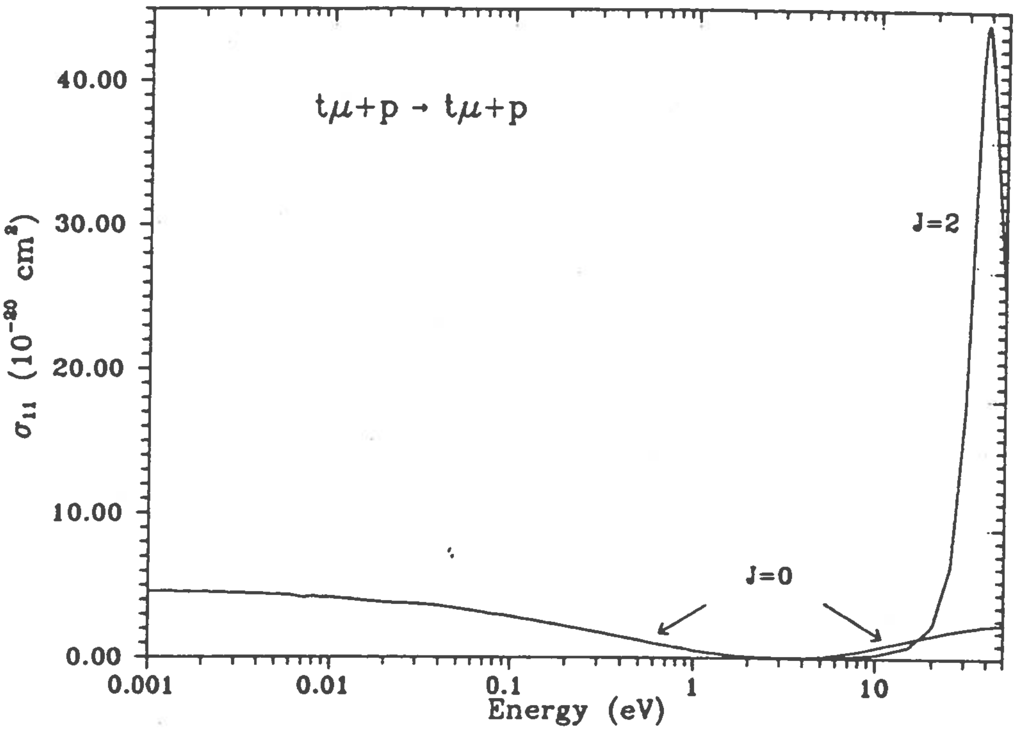

tμ+p → tμ+p
40.00
30.00
20.00
10.00
0.00
σ11 (10^-20 cm^2)
J=2
J=0
0.001
0.01
0.1
1
10
Energy (eV)

Fig. 21

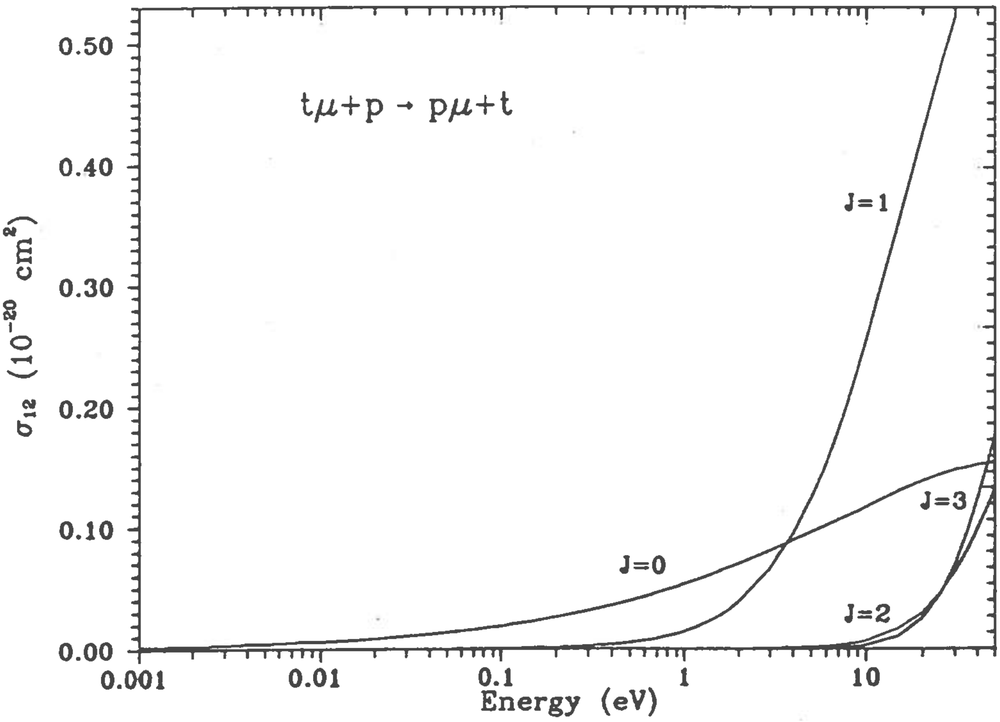

tμ+p → pμ+t
0.50
0.40
0.30
0.20
0.10
0.00
σ12 (10^-20 cm^2)
J=1
J=3
J=0
J=2
0.001
0.01
0.1
1
10
Energy (eV)

Fig. 22

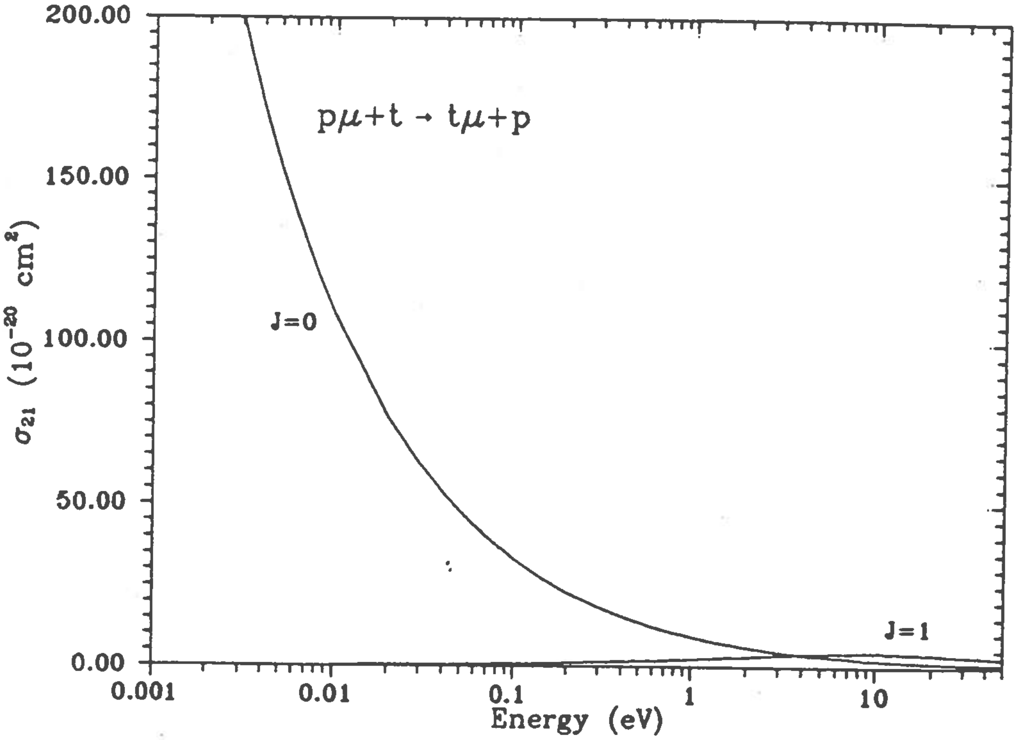

200.00
150.00
100.00
50.00
0.00
σ_{21} (10^{-20} cm^2)
pμ+t → tμ+p
J=0
J=1
0.001
0.01
0.1
1
10
Energy (eV)

Fig. 23

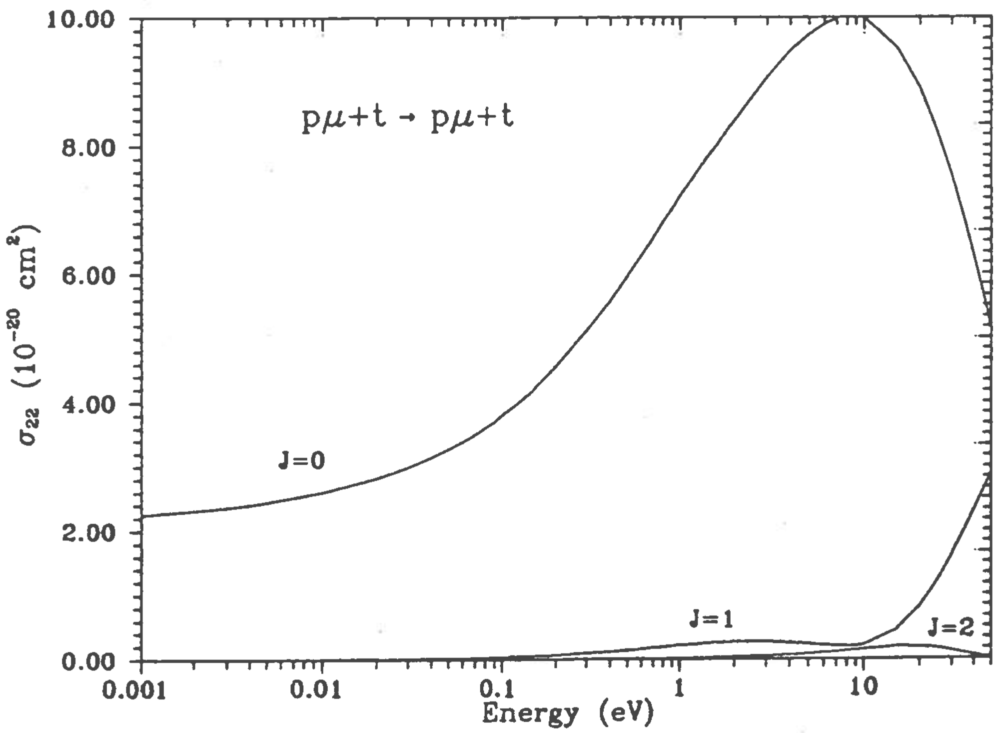

10.00
8.00
6.00
4.00
2.00
0.00
σ_{22} (10^{-20} cm^2)
pμ+t → pμ+t
J=0
J=1
J=2
0.001
0.01
0.1
1
10
Energy (eV)

Fig. 24

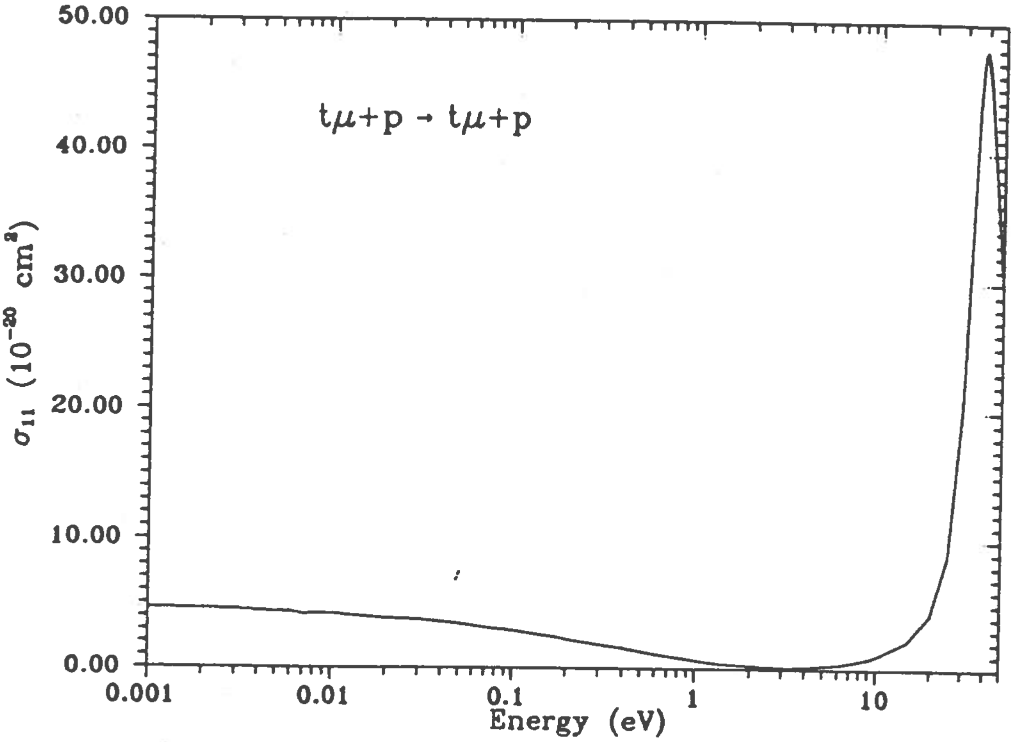


Fig. 25.a

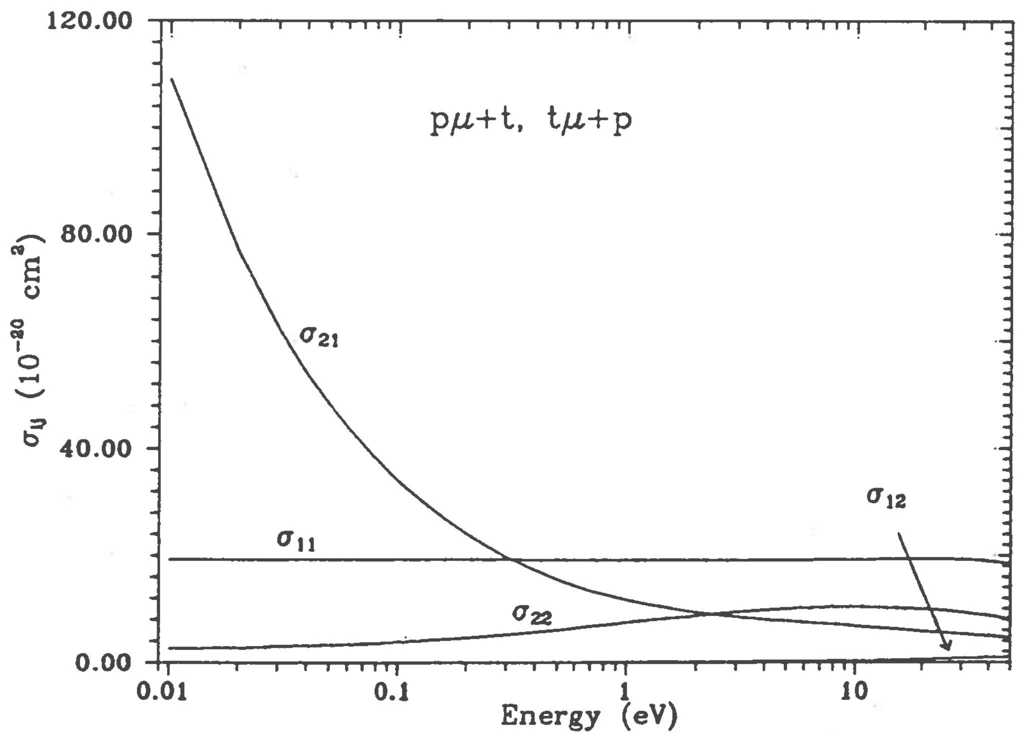


Fig. 25.b

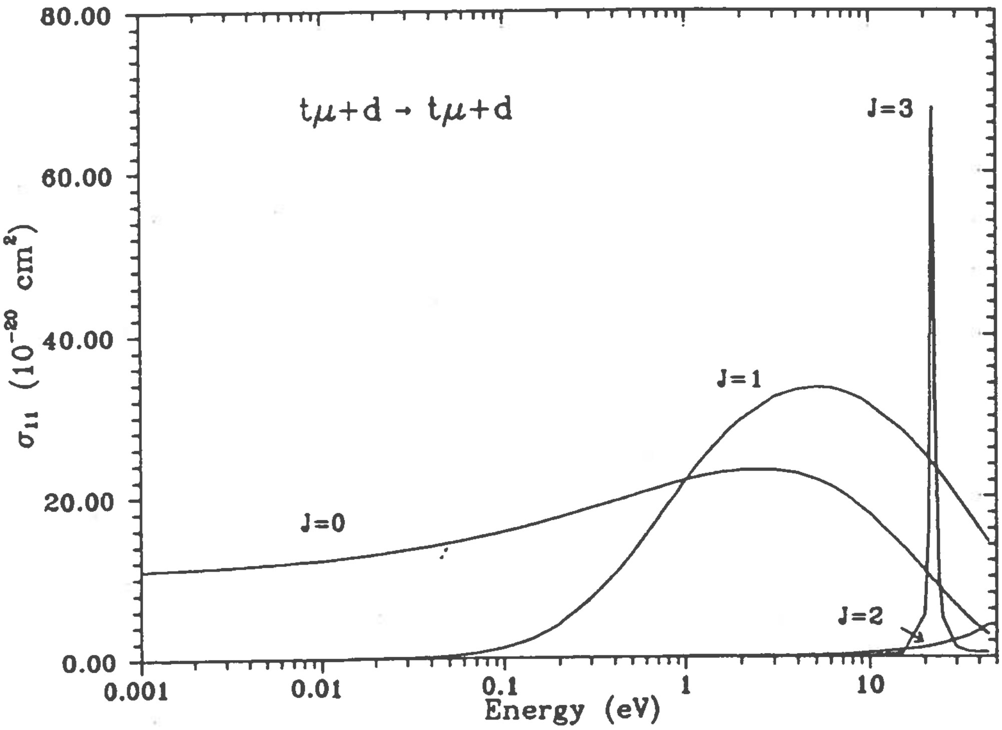

tμ+d → tμ+d
J=3
J=1
J=0
J=2
80.00
60.00
40.00
20.00
0.00
σ11 (10^-20 cm^2)
0.001
0.01
0.1
1
10
Energy (eV)

Fig. 26

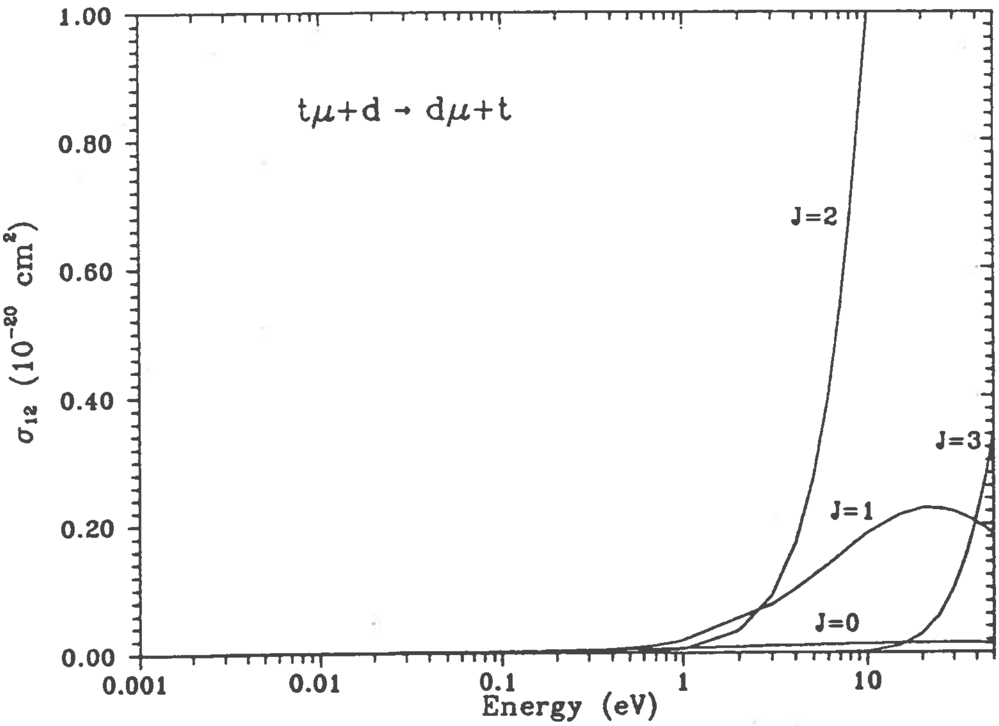
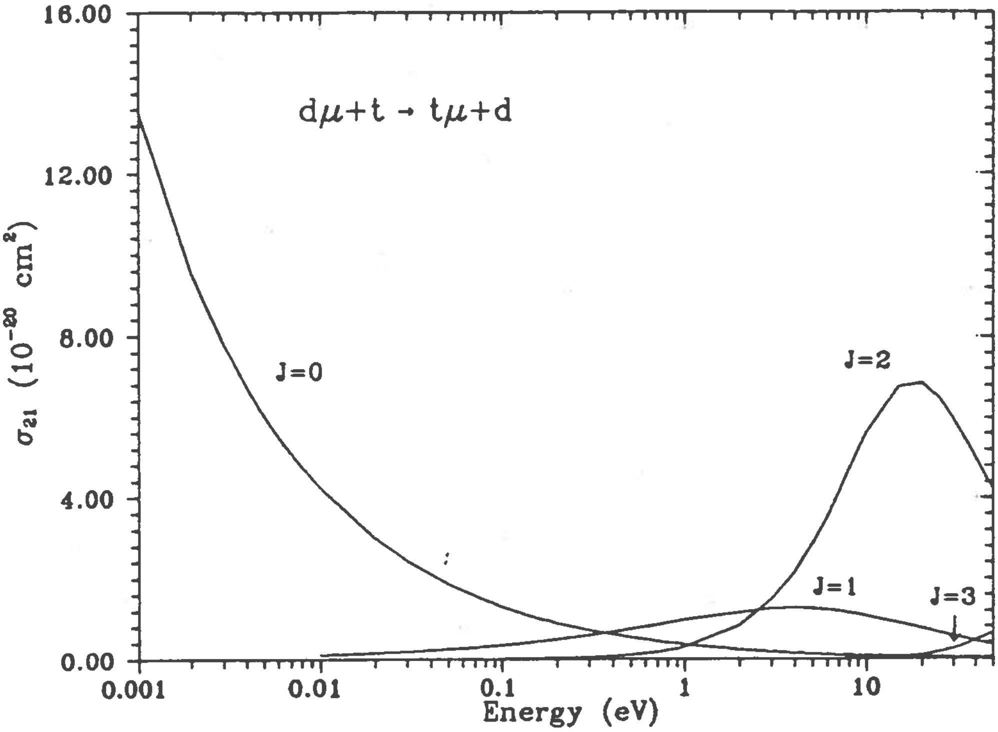
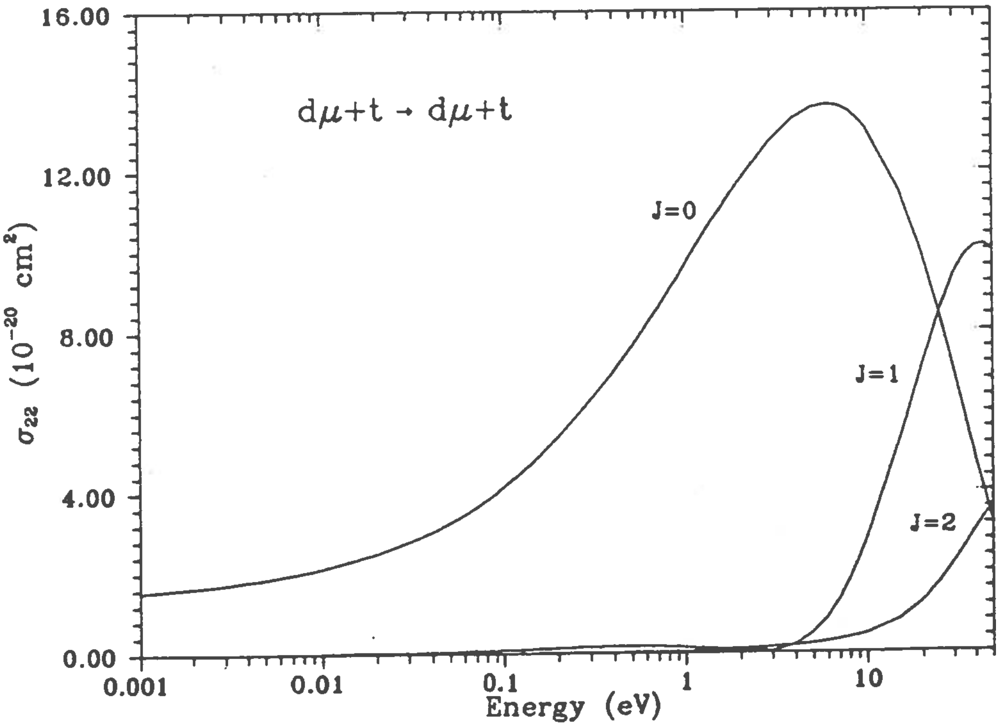

tμ+d → dμ+t
J=2
J=3
J=1
J=0
1.00
0.80
0.60
0.40
0.20
0.00
σ12 (10^-20 cm^2)
0.001
0.01
0.1
1
10
Energy (eV)

Fig. 27



dμ+t → tμ+d
J=0
J=2
J=1
J=3
16.00
12.00
8.00
4.00
0.00
σ21 (10^-20 cm^2)
0.001
0.01
0.1
1
10
Energy (eV)

Fig. 28



dμ+t → dμ+t
J=0
J=1
J=2
16.00
12.00
8.00
4.00
0.00
σ22 (10^-20 cm^2)
0.001
0.01
0.1
1
10
Energy (eV)

Fig. 29

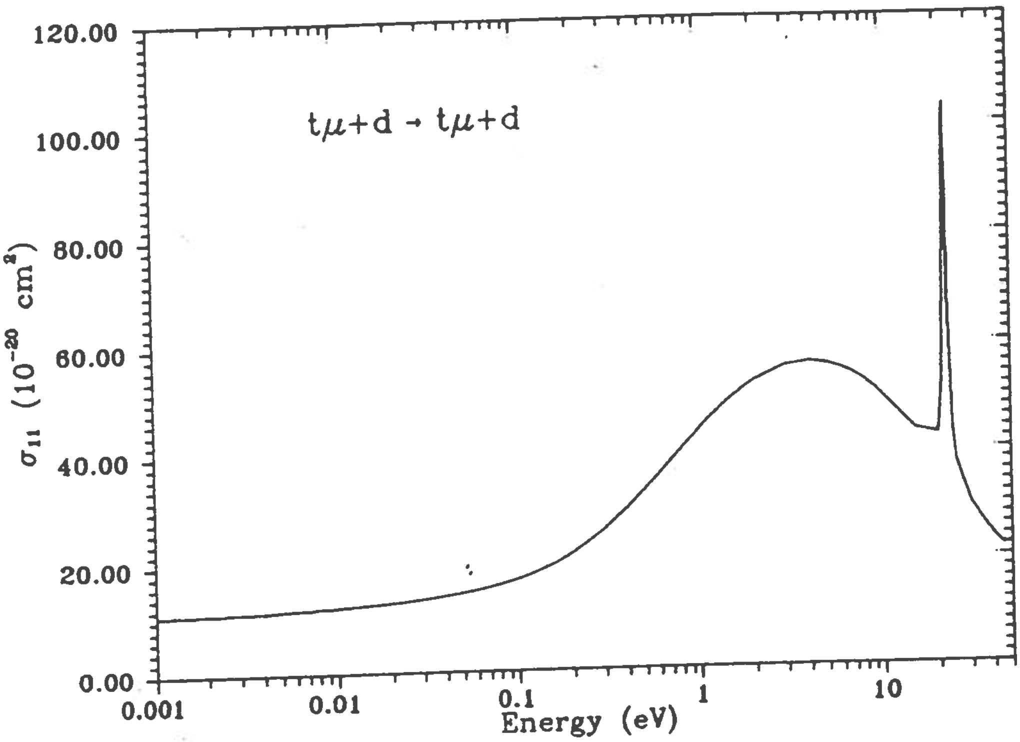


Fig. 30.a

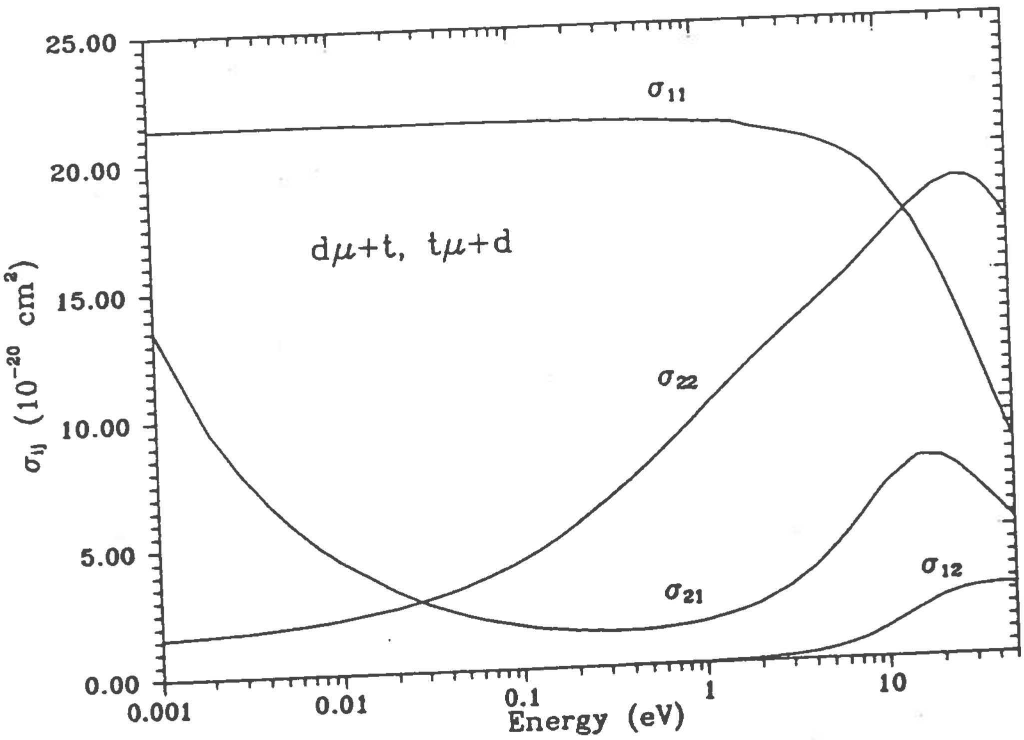


Fig. 30.b