KLOE 1992-2002. 10 year anniversary of CSN1 approval.

TOMORROW, NOON. END OF RUN PARTY
KLOE Building

All speakers. — Talk → Paolo V.

1999 to today

April 14, 1999 KLOE detects $e^+e^- \to e^+e^-$ and $e^+e^- \to K_L K_S$. Also discovers that $\mathcal{L}$ is much lower than claimed.

In '99 $\sim$2 pb^{-1} delivered. Some nice events.

In 2000 $\mathcal{L}$ still very low: $\sim$20 pb^{-1}. The first KLOE physics

Published 4 NIM Papers

Published PL 5 papers

In 2001 $\mathcal{L}$ improved, but the already high bckgnd hit the sky.

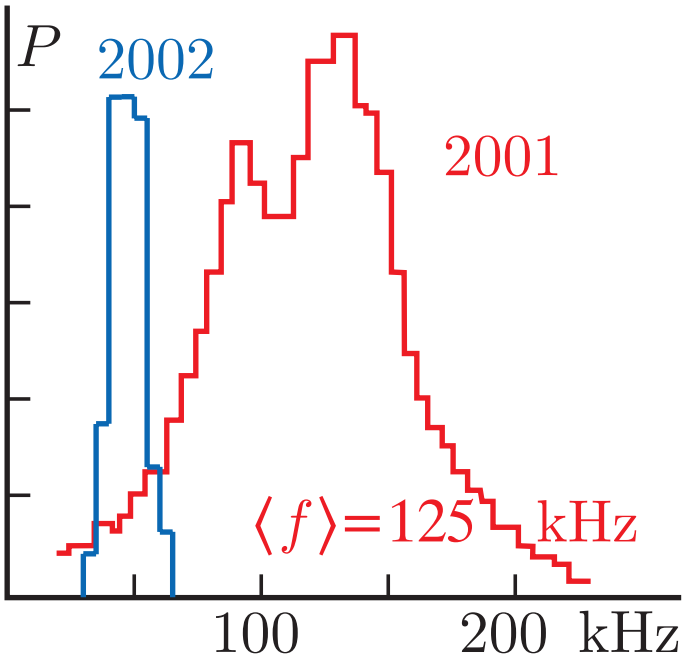
Too much load on: library, processing, reprocessing

In 2002 $\mathcal{L}$ improved and background much reduced.

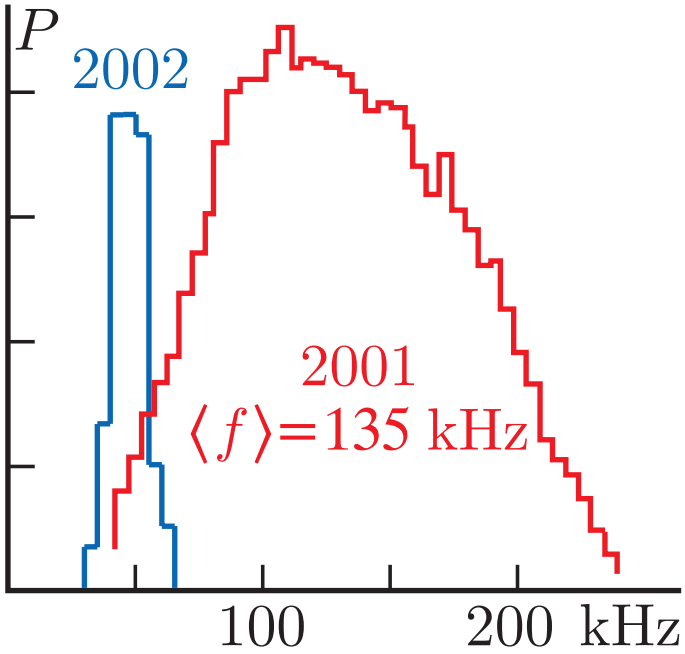
2003 – $\mathcal{L}>10$ pb^{-1}/d – bckgnd shall not increase?

2002

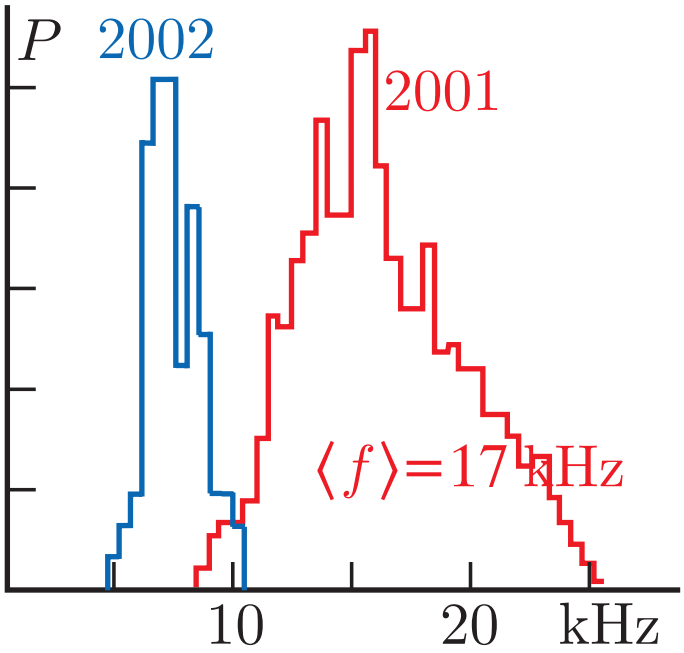
e^-



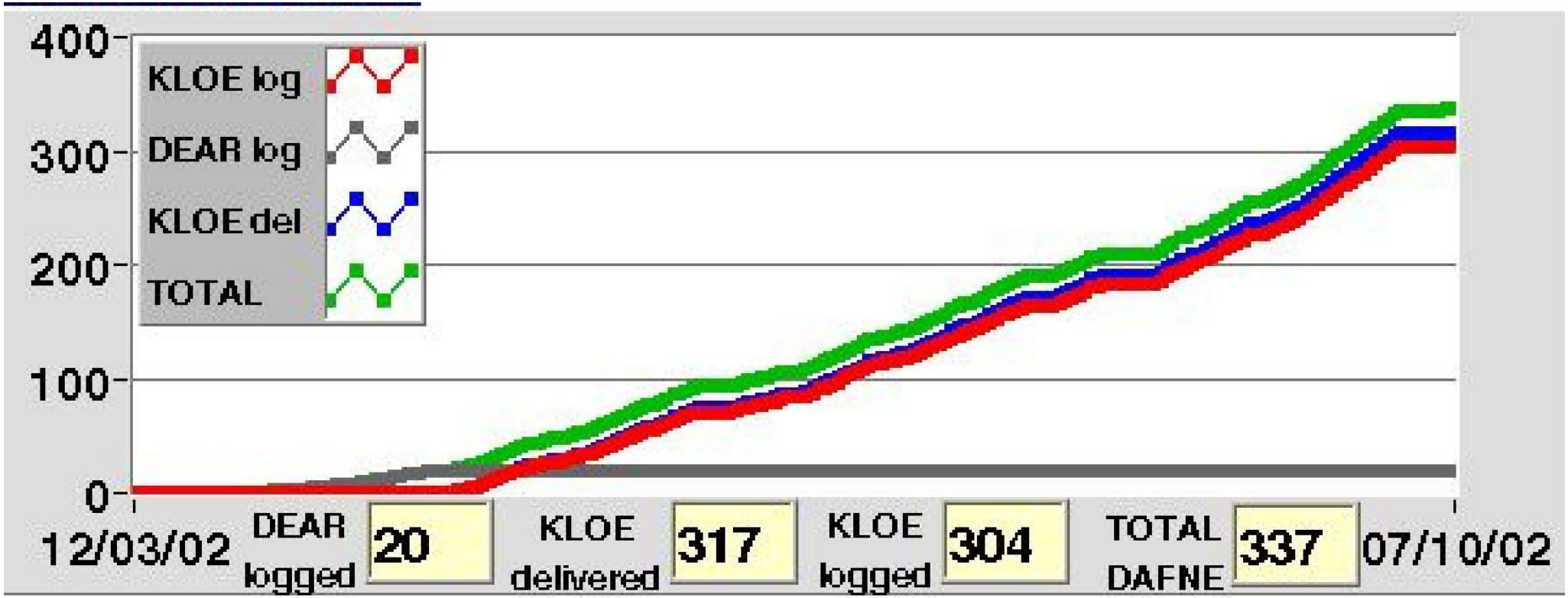
e^+



DC, 1st layer



— $\mathcal{L}$ —



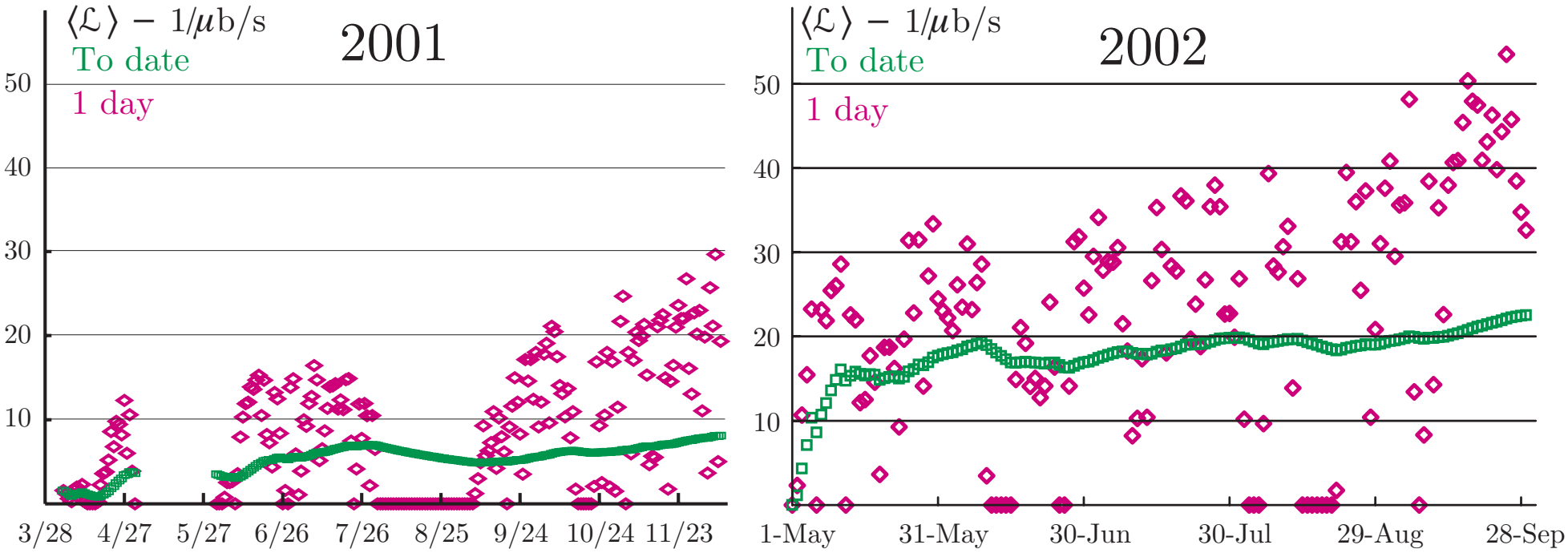
304/317=95.9%!!!!!!!

What is $\mathcal{L}$????

$\mathcal{L}_{deliv}$=296 pb^{-1}?

$\mathcal{L}_{logged}$=299 pb^{-1}?

$\mathcal{L}_{Rec.}$=285 pb^{-1}?


⟨ℒ⟩ − 1/μb/s
2001
To date
1 day
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10
3/28
4/27
5/27
6/26
7/26
8/25
9/24
10/24
11/23
⟨ℒ⟩ − 1/μb/s
2002
To date
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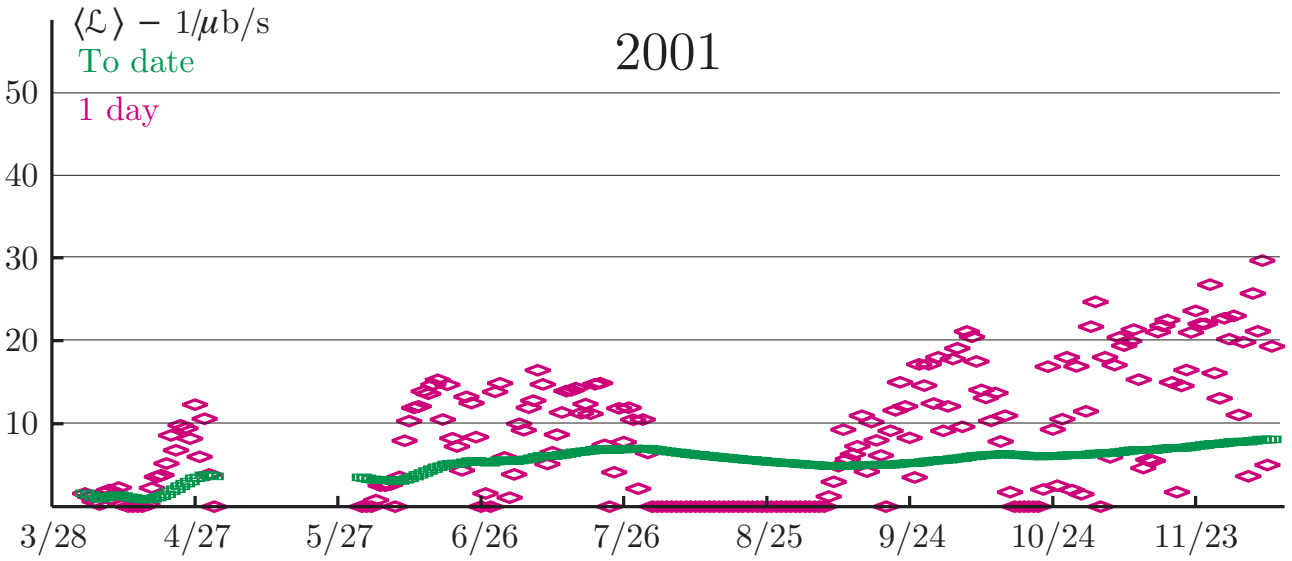
1-May
31-May
30-Jun
30-Jul
29-Aug
28-Sep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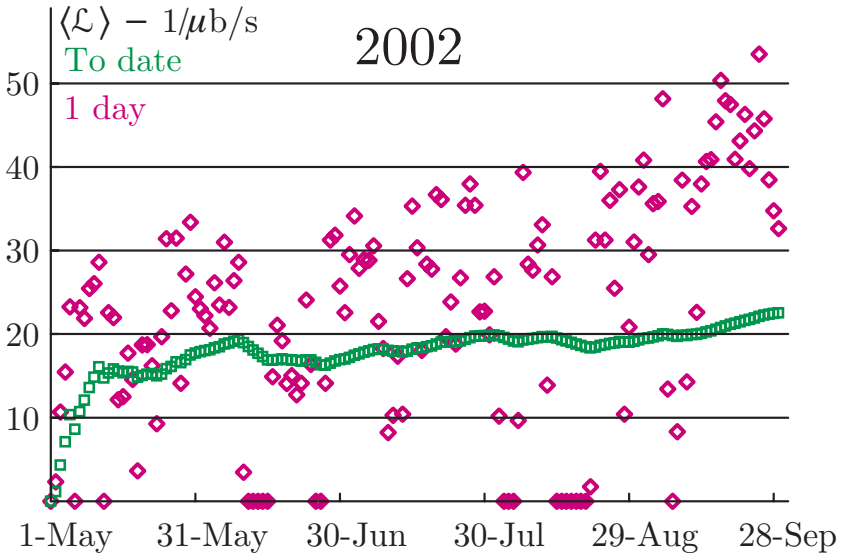
⟨ℒ⟩ − 1/μb/s
To date
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2002
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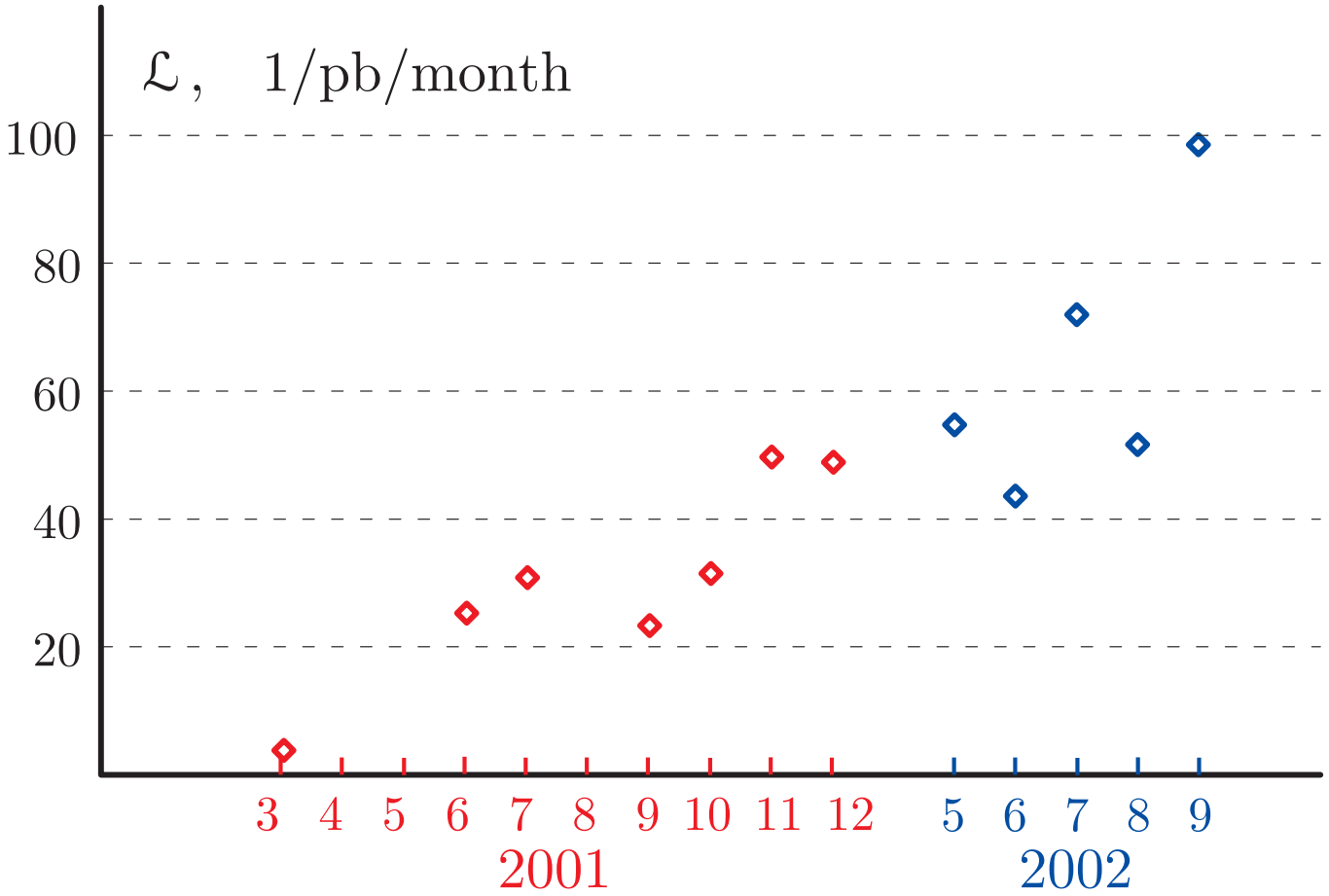
28-Sep



DAΦNE in 2003 could deliver >300 pb^{-1}/month

The Cost of Background

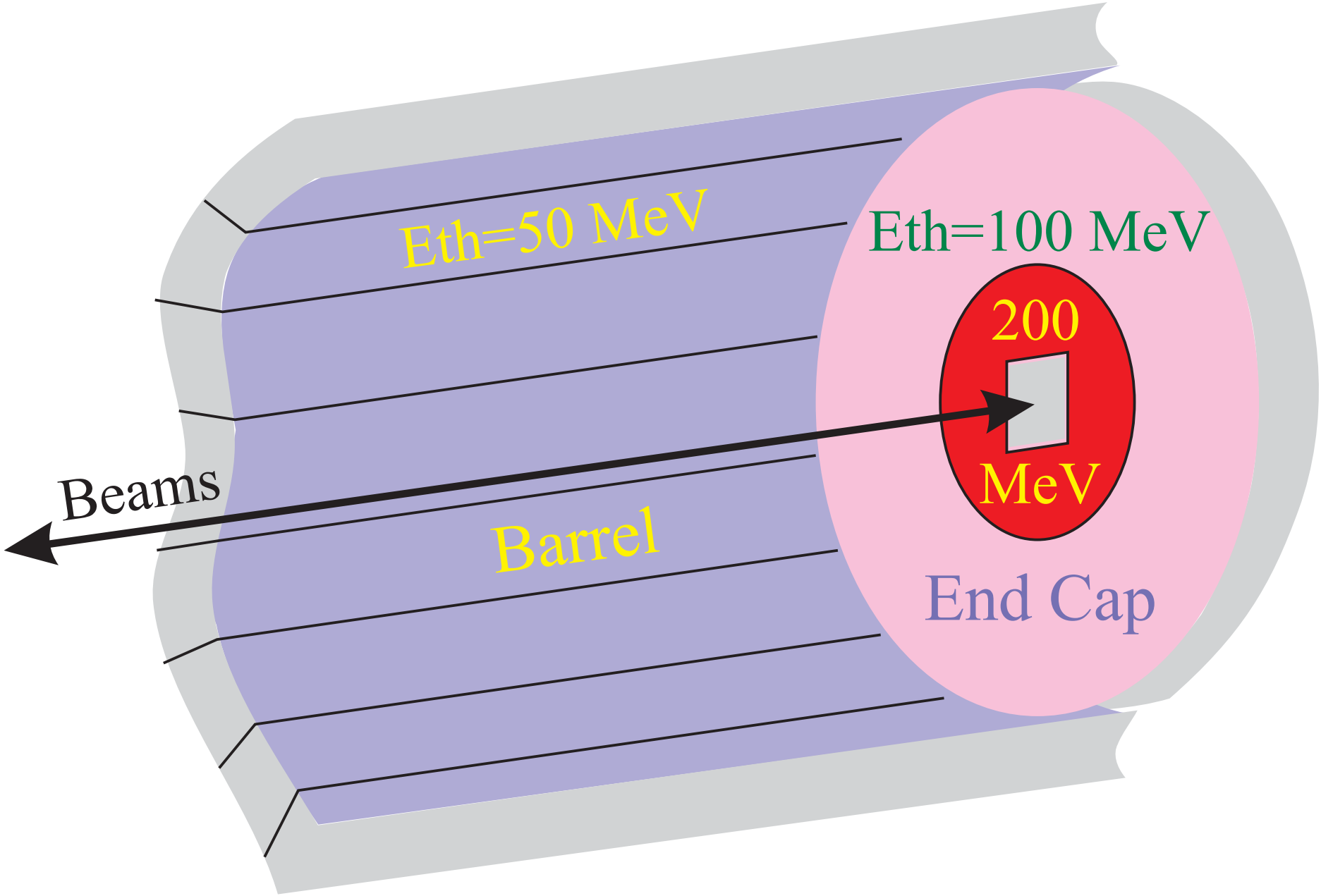
1. Tracking and clustering efficiency
2. Trigger rate: reconstruction and storage cost
3. Accidentals→background to physics
4. '01, '02, '03

- (% of contaminated events)$\propto F$(bckgnd)$\equiv \mathcal{B}$, for any $\mathcal{L}$.
- Trigger rate can be reduced at an additional loss of efficiency

2001

Hardened the trigger at a cost in efficicency. 99.2%→94% for $K_S \to \pi^+\pi^- + K_{e3,\mu3,\pi2}$. Almost $\times 10$ for ζ=1−eff.
Toward the end of 2001 improved $\mathcal{L}/\mathcal{B}$ reduced the load on reconstruction.
For $\mathcal{B}$=(100-300), eff(tracking) drops by $\sim$4.5%.

2001 – 02 Trigger thresholds



Trigger rates in 2002

	High Thr. kHz	Nominal Thr. kHz
T2	3.5	5.5
L3	1.6	$3.3^{\dagger}$
DAΦNE off	$0.7^{\ddagger}$	-
ϕ	0.15	-
Bhabha	0.3	-

† This is larger than 2001, but acceptable at higher $\mathcal{L}$
‡ CR, can be lowered to 0.5 kHz

2003

The machine background must remain low

Loosen thresholds a bit?.

Need MC

Milestones 2002

1. Marzo '02 Ricostruzione dei dati del 2001

2. Maggio '02 DST dei dati 2001 per l'analisi

3. Dicembre '02 Manutenzione di KLOE e presa dati '02

Data taking from 1 May '02

Major weakness – HV CAEN power supplies for phototubes: one PS/wk for 5000 PS's. Ex: CUSB: 0 failures/5 years, for 1000 PS.

4. Dicembre '02 BR($K_S \to \pi e^{\pm} \nu$)
7. Dicembre '02 BR($K_S \to \pi^+ \pi^-$ e $\pi^0 \pi^0$)

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5. Dicembre '02 Misura di $\phi \to \rho\pi$

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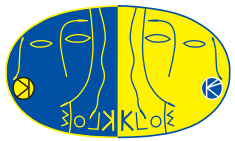
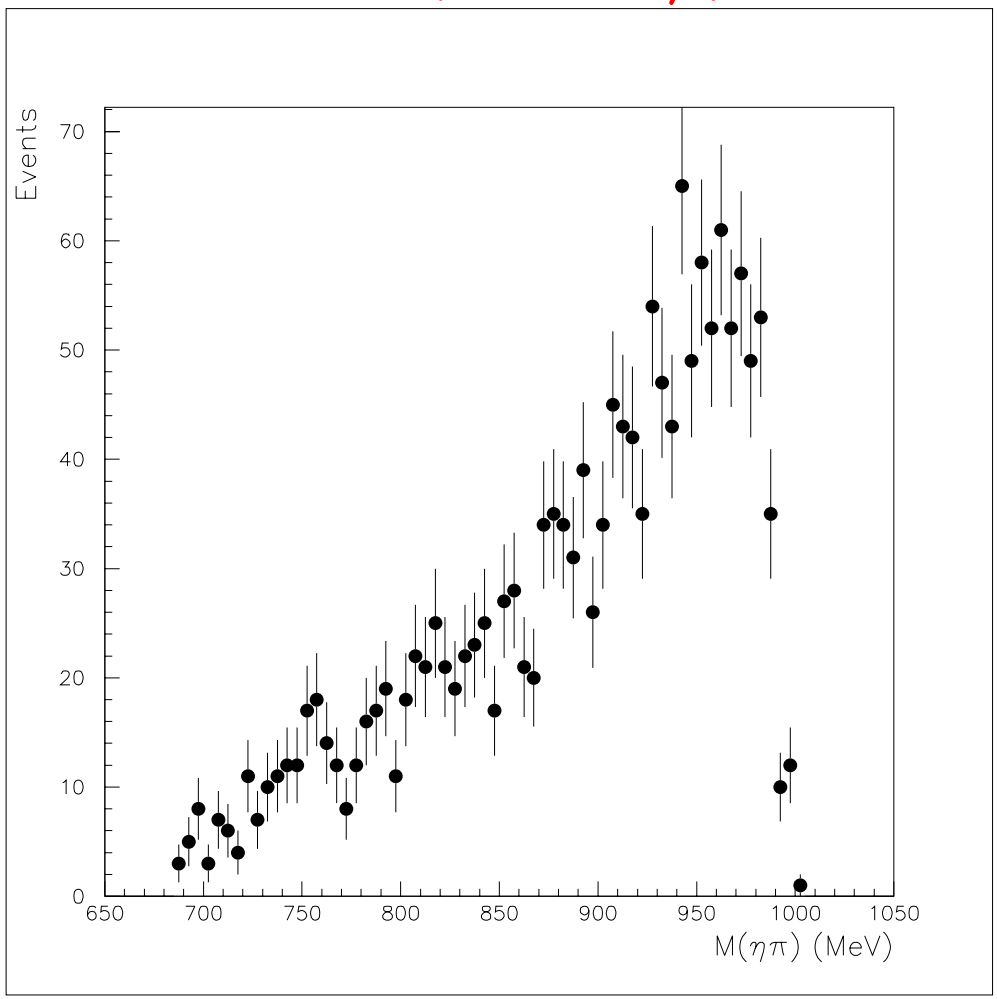
6. Dicembre '02 BR($\phi \to \gamma + a_0,\ f_0$) – OK

Very important to improve our previous results.

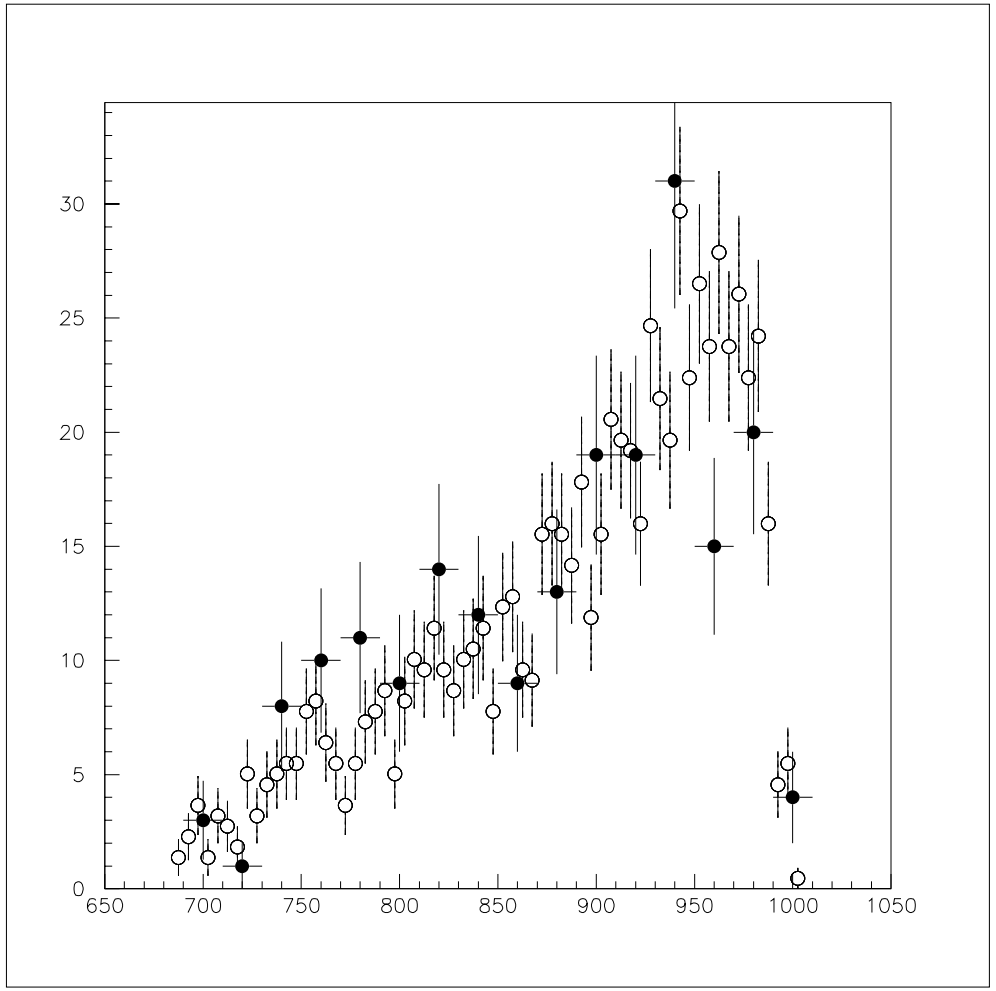


$\phi \to a_0\gamma \to \eta\pi^0\gamma \to \pi^+\pi^-\pi^0\pi^0\gamma \to$ 2 charged+5γ

2001, 142 1/pb

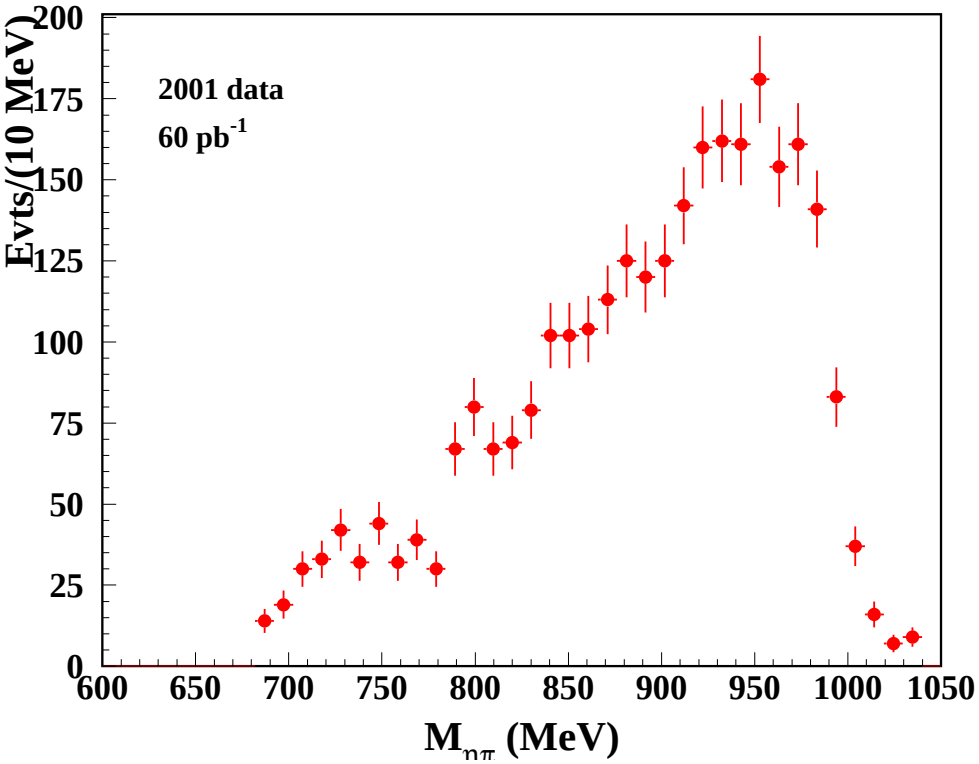


00–01, norm by $\mathcal{L}$

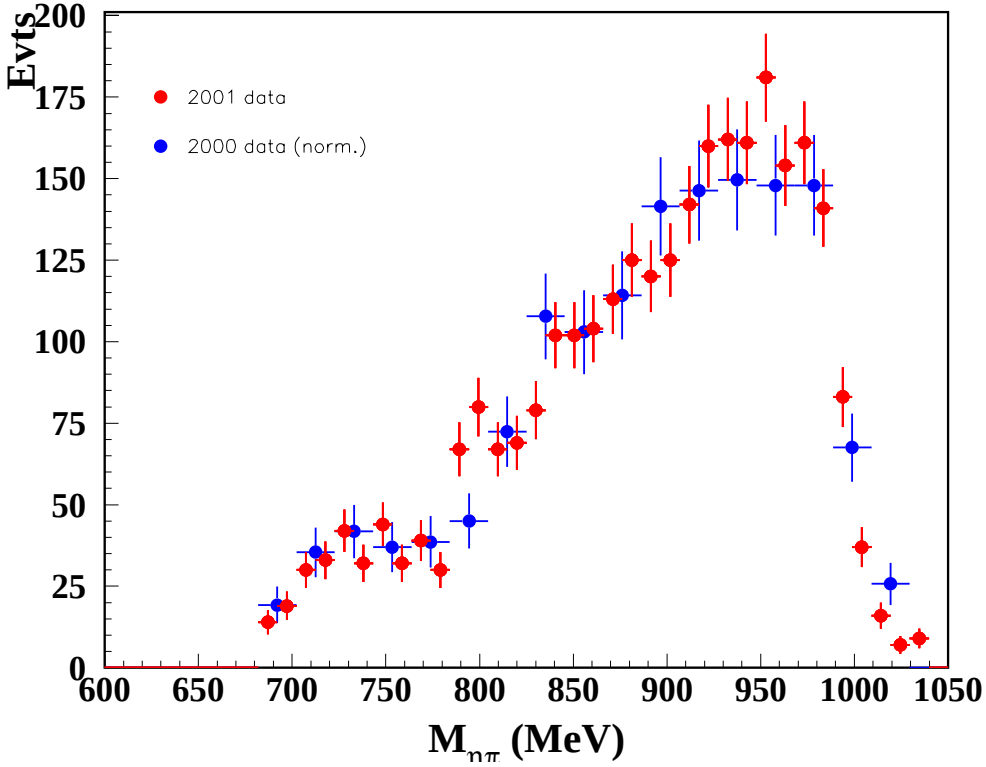


$\phi \to a_0\gamma \to \eta\pi^0\gamma \to \gamma\gamma\pi^0\gamma \to 5\gamma$

2001, 60 1/pb



00–01, norm by $\mathcal{L}$



Confirm 2000 results

Better determination of parameters

8. Dicembre '02 BR($K_L \to \pi^+\pi^-$ e $\pi^0\pi^0$) – OK
9. Dicembre '02 BR($K^\pm \to \mu\nu$, $\to \pi^\pm\pi^0$) – OK??

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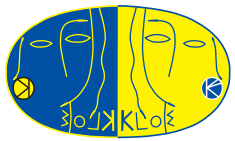
10. Dicembre '02 Misura preliminare di $\sigma(e^+e^- \to \pi^+\pi^-)$ – OK
Also pion form factor



Milestones for Dec. 31, 2003

1. Ricostruzione dati 2002 – 1/4
2. Lavoro su KLOE per nuova regione di interazione – 1/4
3. Upgrade del Q-Cal – 1/4
4. Preparazione DST per analisi – 1/4
5. Upgrade del filtro di livello 3 – 1/4
6. Monte Carlo per analisi 2002 – 1-4/4
7. BR, σ per $K^{\pm}$ – 2-4/4
8. Analisi con errori sistematici ridotti, dati 2002 – 4/4
9. Manutenzione e presa dati nel 2003 – ?-4/4

KLOE Physics

An I-spin rotation, $(K^{\pm}\pi^0) \circlearrowright (K_L\pi^{\pm})$, appears when we consider the semileptonic decays $K^{\pm}\to\pi^0(e\nu)$ and $K_L\to\pi^{\pm}(e\nu)$. Ignoring I-spin corrections, we have:

$$\Gamma(K_{L,e3}) = \Gamma(K_{S,e3}) = 2\times\Gamma(K^{\pm}_{e3}).$$

Correcting for phase space, 0.8%, the measured values give:

$$\frac{2\Gamma_+ - \Gamma_L}{\Gamma_L} = (3.66 \pm 0.06)\%$$

Too big??? To get V_{us} to better than 1.1%, 39 years after its introduction, we need that correction – but we can check it. We need more: SU(3) corrections.

The I-spin rotation $(\pi^+\pi^-) \circlearrowright (\pi^{\pm}\pi^0)$, relating $e^+e^-\to\pi^+\pi^-$ and $W^{\pm}\to\pi^{\pm}\pi^0$, seems to give a 4% effect. Too much people say.

In some kind of jargon one must compute corrections due to I-spin and $SU(3)_{\text{flavor}}$ breaking. In another, we need QCD calculation of the hadronic matrix elements. Progress is slow but coming.

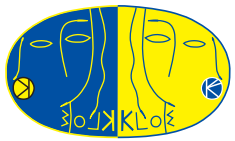
Unique contributions from KLOE.

K_L, K_S and $K^{\pm}$ semileptonic decays, which KLOE can do to accuracies beyond present theoretical ablilities.

Measurements of the neutral pion current coupling to the photon to help with the τ–e^+e^- discrepancy

Precision measurements of $K \to \pi\pi$ rates and the study of scalar and pseudoscalar meson via ϕ-radiative decays.

We have the data for doing this. Theory is behind. Good measurements are needed and are also inducements to better calculations.



We expected in 2003 a very improved DAΦNE. We must recover the efficiency losses in the trigger. We must save our energies for physics, not taking shifts.