

EURIDICE

Start - off

Collaboration Meeting

Presentation of the CPT - Marseille node

Frascati

Oct. 18-20 2002

Knecht

2.

Centre de Physique Théorique Marseille - Luminy

70 permanent positions

- 25 CNRS
- 44 University positions (Prof + Ass. Prof)
distributed over 3 universities

Université de Provence (Aix-Marseille I)

Université de la Méditerranée

(Aix-Marseille II)

Université de Toulon et du Var

~ 25 PhD students are being trained

~ 8 ÷ 10 theses / year

Many fields of Mathematical and Theoretical Physics are represented

Dynamical Systems

Mathematical aspects (billiards, geometrical entropy, ...)

Applied aspects (development of instabilities in physical systems, plasmas, ...)

Condensed Matter

Transport in nanosystems

Strongly correlated electrons, high T_c superconductivity

Quantum Hall effects

Quantum Field Theory

Symmetries in low-dimensional systems

(quantum groups, CFT, W algebras, ...)

Superspace formulations of extended supergravities, mirror symmetries

Quantum gravity

Non commutative geometry

Biophysics

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Statistical mechanics and probability

Metastability, Wulff construction

Wetting, percolation

Phase transitions, BE condensation

Open systems

Particle physics

Non perturbative aspects in decays of K & B

CP violation

Gauge theories at finite temperature

Spin physics (polarized structure functions, ...)

Euridice participants

J. Charles

L. Giusti

P. Chiappetta

L. LePlouch

M. Perrottet

E. de Rafael

M.K.

+ 4 PhD students + 1 post-doc

Non perturbative aspects of the SM
at low energies in both sectors of
light and heavy quarks

- Chiral perturbation theory
- $1/N_c$
- HQET, LEET
- Lattice

6

Kaon decays and $\mathcal{CP}$, B physics and $\mathcal{CP}$

- Matrix elements of 4-quark operators

$$Q_7, Q_8, Q_6, \dots$$

B_K beyond chiral limit

Analytical approaches + numerical simulation
new approach for $K \rightarrow \pi\pi$ matrix elements
on the lattice

- Large N_c models, determination of low-energy constants

$$\mathcal{O}(p^6) \text{ LECs}$$

Radiative corrections in K decays

- Semi-leptonic decays (isospin breaking)

$$K_{\ell 3} \rightarrow V_{us}$$

$$K_{\ell 4} \rightarrow \pi\pi$$

$$\pi - \beta \rightarrow V_{ud}$$

- $(g-2)_\mu$

Hadronic contributions to higher order
corrections ($\mathcal{O}(\alpha^3)$)

- rare K decays

$$K_L^0 \rightarrow \mu^+ \mu^-$$

- 7.
- $K \rightarrow \pi\pi$ on the lattice

LeLouch - Lüscher approach

$$\Delta I = 3/2, \quad \epsilon'/\epsilon$$

- Large- N_c approach to B sector observables
 f_B , $m_{B^\pm} - m_{B^0}$, $B_{(cs)}^0 - \bar{B}_{(cs)}^0$ mixing.

- Determination of LECs from finite size scaling studies in lattice QCD, using GW fermions

- $B_d \rightarrow D\bar{D}$ transitions

(incl. $\Delta I = 3/2$ contributions)

Inter-node collaborations

Orsay (B physics, chiral symmetry)

Barcelona (Q_i , B_K , B physics, $(g-2)_\mu$)

Vienna	}	Radiative corrections in semi-leptonic K decays
Valencia		

Valencia Lattice