

Workshop su DaΦne 2

- **C.Luci** : Introduzione
- **C.Biscari** : Design study for a Super- Φ -factory at LNF
- **F.Ferroni** : Cosa può aggiungere DaΦne 2 alla fisica dei sapori
- **P.Franzini**: Dalla fisica di Kloe a quella di Kloe 2, ovvero fino a dove può arrivare una Φ -factory?



Workshop on
 **$e^+ e^-$ in the 1-2 GeV range:
Physics and Accelerator Prospects**

ICFA Mini-workshop - Working Group on High Luminosity e^+e^- Colliders

10-13 September 2003, Alghero (SS), Italy

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THE FLAVOR SAGA:

'60–'70: golden age of kaon physics

'80 first B -physics era

2nd generation of ϵ'/ϵ measurements

'90 second B -physics era

'99–'01 direct CPV in the kaon system

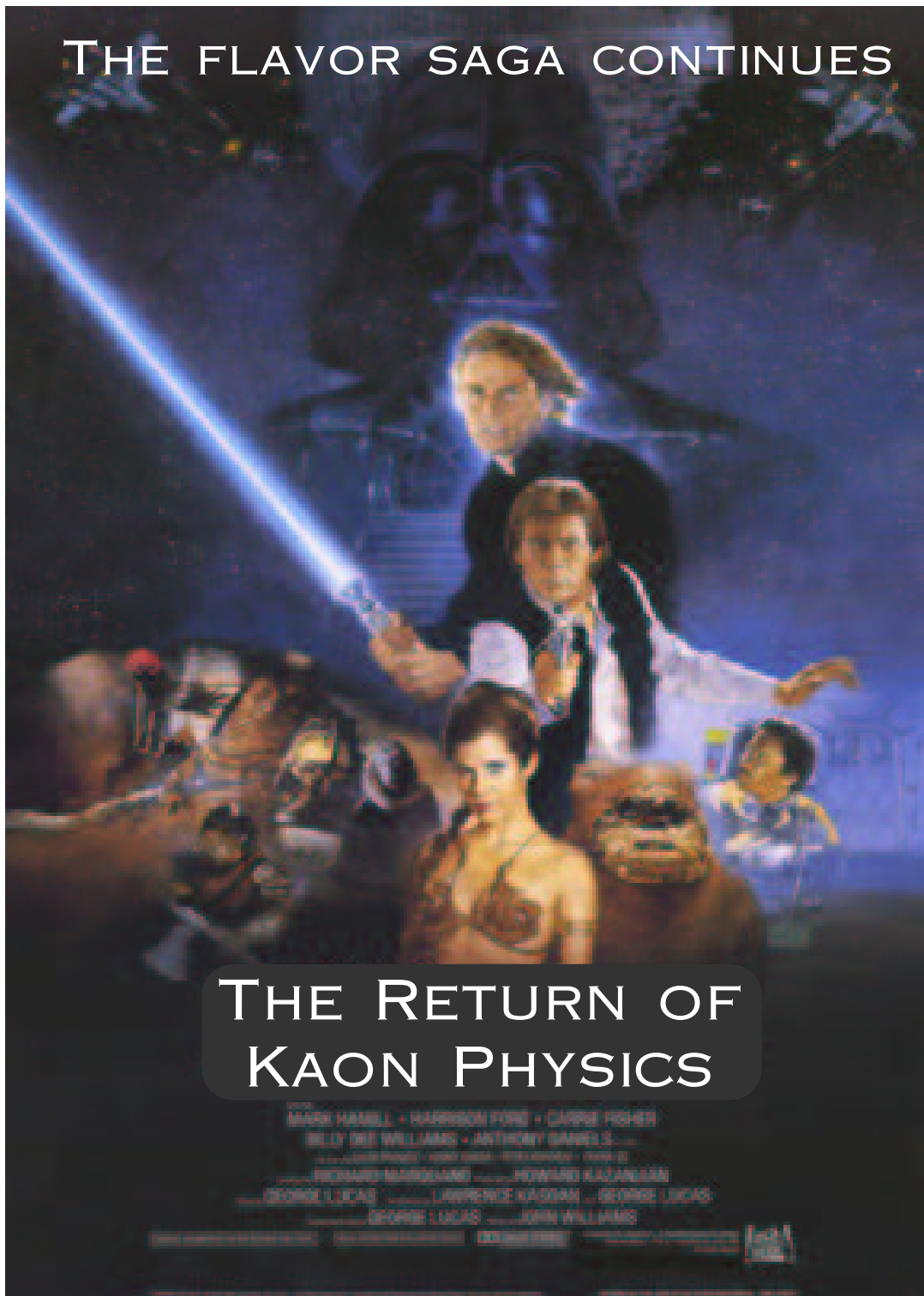
'01–'03 CPV in the B system

*... theoretically-clean and experimentally-easy observables
at B factories almost exhausted...*



renewed interest in kaon physics

THE FLAVOR SAGA CONTINUES



THE RETURN OF
KAON PHYSICS

MARK HAMILL • HARRISON FORD • CARRIE FISHER

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Highlights of the kaon–physics program @ Φ –factory vs. luminosity:

10^0 fb^{-1}
 $[\approx 10^9 K\bar{K}]$

\approx KLOE
 now

V_{us} from K_{l3} @ 10^{-3} (CKM);
 rare K_S decays down to $\text{BR} \sim 10^{-8}$ (CHPT/CPT);
 10^{-2} bounds on $K_S \rightarrow \pi l \nu$ charge asym. (CPT)

⋮

10^1 fb^{-1}
 $[\approx 10^{10} K\bar{K}]$

original
 KLOE
 program

$\text{Re}(\epsilon'/\epsilon)$ @ 10^{-4} (direct CPV);
 $K_{L,S}$ interf. $\Rightarrow \text{Im}(\epsilon'/\epsilon)$ @ 10^{-2} (CPT);
 $\pi\pi$ phases from K_{l4} @ % level (QCD vacuum)

⋮

10^2 fb^{-1}
 $[\approx 10^{11} K\bar{K}]$

CPT tests @ unprecedented level of precision via
 rare K_S & $K_{L,S}$ interferences;
 search for exotic direct CPV in K^\pm asym. and rare K_L decays

⋮

10^3 fb^{-1}
 $[\approx 10^{12} K\bar{K}]$

frontier
 of
 flavor
 physics

sensitivity to $K_L \rightarrow \pi^0 \nu \nu$ (& $K_L \rightarrow \pi^0 e e$) at the SM level:
 region of high discovery potential for non–standard sources
 of CPV via new tests of the CKM mech. in the kaon system

\Rightarrow very interesting also in a long–term perspective \Leftarrow

10^4 fb^{-1}

⋮

⋮

• Conclusions

I'm strongly in favor of the high-luminosity option!

and if the option is realistic

I'm ready to defend it...



DAFNE status and outlook

- **Adiabatic changes on DAFNE approaching to an end.**
 - **DAFNE performances expected to reach the original design goals ($L = 5 * 10^{32}$), within the next 2 years.**
 - **3- 4 years of physics program fully booked with current (or slightly upgraded) detectors.**
 - **After that, only radical changes possible**
-

Some commonsense considerations

- **Reminding the recent history of DAFNE, avoid to put all bets on a overly ambitious goal.**
 - **Build a credible physics program, for a luminosity span of 2 orders of magnitude. (33-35)**
 - **Share the load between detector and machine.**
 - **Do not diverge in the time (~ 5 years from now) and money (~ 100 Meuro) scales**
 - **Strengthen the collaboration within the “rare decay” community**
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Energy vs Luminosity

- Not an issue at this point.
 - If the progress of the new machine design shows a conflict between high energy and high luminosity, examine if high energy program could be exploited in the phasing out of DAFNE (using the current detectors)
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Next steps

- **Keep going!**
 - **Interim status report at the DAFNE conference in spring 2004 and at the CERN October 2004 meeting.**
 - **Repeat this workshop !**
 - **Start the R&D and test measurements on accelerator and detectors.**
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