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Kaon-nuclei interaction studies at low energies (the AMADEUS experiment)

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The AMADEUS experiment [1,2] aims to perform dedicated precision studies in the sector of low-energy kaon-nuclei interaction at the DAFNE collider at LNF-INFN. In particular, the experiment plans to perform measurements of the so-called (very debated) deeply bound kaonic nuclei and, if existent, to measure their properties (binding energies and widths) by using the stopped kaons in cryogenic gaseous targets (3He and 4He). AMADEUS will measure all particles coming from negative kaons stopped in these targets, so performing a full study of the various interaction channels. Other important measurements proposed are the low-energy interactions of negative kaons in various targets. The kaon beam is ideal (low-energy kaons from the phi-decay at DAFNE), while a dedicated setup will be implemented in the central region of the KLOE detector.
The analysis of the existing KLOE data and dedicated Monte Carlo simulations, give the opportunity to check the reconstruction capability for sigma and lambda particles (expected to be present in the decay channels of the exotic states) and to study the hadronic interactions of K- with the 4He that fills the drift chamber.
The results of AMADEUS will give a boost to the sector of non-perturbative QCD in the strangeness sector.
The physics program, preliminary results from the analysis of KLOE data and future plans will be presented.

References:

[1] AMADEUS Letter of Intent, http://www.lnf.infn.it/esperimenti/siddharta/LOI_AMADEUS_March2006.pdf

[2] The AMADEUS collaboration, LNF preprint, LNF07/24(IR) (2007).

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