Contribution ID: **3** Type: **not specified**

Advances and perspectives in the low-energy kaon-nucleon/nuclei interaction studies at the DAFNE collider

The low-energy QCD in the strangeness sector is still lacking fundamental experimental results in order to achieve a breakthrough in its understanding. Among these experimental results, the low-energy kaon-nucleon/nuclei interaction studies are playing a key-role.
Combining the excellent quality kaon beam delivered by the DAFNE collider with new experimental techniques, as fast and very precise X ray detectors, like the Silicon Drift Detectors, and with the almost full acceptance charged and neutral particles KLOE detector, we have performed unprecedented measurements in the low-energy strangeness sector in the framework of SIDDHARTA and AMADEUS Collaborations.
The kaonic atoms, as kaonic hydrogen and kaonic deuterium, provide the isospin dependent kaon-nucleon scattering lengths from the measurement of X rays emitted in the de-excitation process to the fundamental 1s level of the initially excited formed atom. The most precise kaonic hydrogen measurement was performed by the SIDDHARTA collaboration, which realized, as well, the first exploratory measurement for kaonic deuterium ever. Additional important measurements of more complex systems, as kaonic helium 3 and kaonic helium 4, were as well done (the kaonic helium 3 was measured for the first time as well). Presently, a major upgrade of the setup, SIDDHARTA-2 is ready to perform in the near future a precise measurement of kaonic deuterium and other exotic atoms.
The kaon–nuclei interactions are being measured by the AMADEUS collaboration for kaon momenta smaller than 100 MeV/c by using the KLOE detector implemented in the central region with a dedicated setup. Preliminary results for the interaction of negatively charged kaons with various type of nuclei will be shown, including an analyses of the still "mysterious" $\Lambda(1405)$. Future plans will be discussed.
DAFNE, with SIDDHARTA, SIDDHARTA-2 and AMADEUS, represents an opportunity which is unique in the world to, finally, unlock the secrets of the QCD in the strangeness sector, with important consequences going from particle and nuclear physics to astrophysics.

Primary author: Dr SCORDO, Alessandro (Laboratori Nazionali di Frascati INFN)

Presenter: Dr SCORDO, Alessandro (Laboratori Nazionali di Frascati INFN)