Strangeness in the Universe? Low-energy kaon-nuclei interaction studies by AMADEUS at the DAΦNE collider

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The low-energy QCD in the strangeness sector is still lacking fundamental experimental information in order to enable a breakthrough in its understanding. A deeper understanding of the QCD in non-perturbative regime, moreover when strange quarks are involved, has very important consequences, which are extending from particle and nuclear physics to astrophysics. In this context, the low-energy kaon-nuclei interaction studies are playing a key-role, since they can provide a series of unique results which will contribute to unveil the secrets of the QCD in the strangeness sector and could even shed some light on the role strangeness might play in the Universe. By using the excellent quality low-energy charged kaon beam delivered by the DAΦNE collider at the Frascati National Laboratories we will obtain unprecedented results in the low-energy strangeness processes studies in the framework of the AMADEUS Collaborations. The kaon-nuclei interaction processes are going to be 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. First results for the interaction of negatively charged kaons with various type of nuclei will be shown, including analyses of the Λp, Σp, Λd and Λt channels, as well as of the still "mysterious" Λ(1405). Future plans will be discussed, together with ongoing R&D activities for optimizing the performance of the AMADEUS setup, among which the test of an active target TPC-GEM detector.

AMADEUS at DAΦNE represents an opportunity which is unique in the world to, finally, unlock the secrets of the QCD in the strangeness sector, and to contribute to the understanding of the possible role strangeness might play in the Universe. Is there any place for strangeness in neutron stars? This question, especially after the discovery of the 2 solar masses neutron stars, is a very hot one.