

ANTIKAON INTERACTIONS WITH NUCLEONS AND NUCLEI – AMADEUS AT DAΦNE

Johann Marton¹

¹Stefan Meyer Institute (SMI), Austrian Academy of Sciences

There is substantial progress in the understanding of the strong interaction involving strange quarks. However, many aspects of the interactions of antikaons with nucleons and nuclei are still open which are also related to the open question about the role of strangeness in neutron stars. The K^- nucleon interaction is strongly attractive at low energies in agreement to theory. This attraction is observed in kaonic hydrogen [1] which was studied in experiments at the DAΦNE electron-positron collider of LNF-INFN (Frascati/Italy). Resonances like the elusive $\Lambda(1405)$ in the s wave impose questions about its nature. In recent theoretical studies it is described as a dynamically generated resonance with two poles [2]. Other studies claim that $\Lambda(1405)$ is a quasi-bound state K^-p , which could lead to kaonic nuclear bound states with multiple nucleons (e.g. K^-pp). An insight in many open facets of the antikaon interactions can be provided by the planned AMADEUS experiment at DAΦNE, which will be based on the KLOE detector [3]. As a first step toward AMADEUS data from K^- induced reactions in the drift chamber of KLOE were analyzed and yielded new results on K^- absorption on nuclei [4]. The physics topics of the AMADEUS project will have a wide range from kaon scattering in the unexplored low momentum region to studies of K^- absorption processes taking advantage of the low-energy kaon source provided by DAΦNE and the KLOE 4π detector system for neutral and charged particles. The results of the antikaon interaction experimental studies and an outlook to the future studies within AMADEUS will be presented.

[1] M. Bazzi et al.(SIDDHARTA Coll.), Phys. Lett. B 704 , 113 (2011).

[2] T. Hyodo, D. Jido, Prog. Part. Nucl. Phys. 67, 55-98 (2012).

[3] The AMADEUS collaboration, LNF preprint, LNF/9607/24(IR) (2007).

[4] O. Vázquez Doce et al., arXiv:1511.04496v1 [nucl-ex] (2015).