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Unveiling the antikaon/nucleon-nuclei strong interaction dynamics in the low-energy regime with SIDDHARTA-2 and AMADEUS

Wednesday, 19 May 2021 14:00 (30 minutes)

The investigation of the low-energy strong interaction between antikaons and nucleons is crucial for a better understanding of the QCD in non-perturbative regime, with implications going from the domain of particle and nuclear physics to astrophysics. Precise experimental information on the K^-N scattering at the energy threshold can be extracted exploiting kaonic atoms. SIDDHARTA-2, which is presently installed at the DAΦNE collider (in its reduced version SIDDHARTINO), will measure the X-rays emitted in the atomic transitions of the kaonic deuterium, with the aim to extract the energy shift and broadening of the 1s level induced by the strong interaction. The combined measurements for the kaonic deuterium and the kaonic hydrogen will allow to extract for the first time the isospin I=0 and I=1 K^-N scattering lengths, which will place strong constraints to the low-energy antikaon-nucleon dynamics. Further experimental information are provided by the AMADEUS collaboration from the study of the K^- absorptions at-rest and in-flight (p_K ~ 100 MeV/c) on light nuclei (H, ^{4}He, ^{9}Be and ^{12}C). The hyperon-pion and hyperon-nucleon/nuclei emitted in the final state of the K^- captures on the materials of the KLOE detector, used as an active target, are reconstructed and analysed. Such studies delivered in the last few years the first comprehensive measurement of the yields of the K^- two-, three- and four-nucleon absorption processes, fundamental ingredients for the determination of the K^- nuclear optical potential, as well as the first measurement of the $K^-n \rightarrow \Lambda\pi^-$ s-wave amplitude in the energy region below the threshold. The contribution will give an overview of the new SIDDHARTA-2 setup, recently installed at the DAΦNE collider, showing the preliminary results and future plans. Finally, the main AMADEUS results will be presented.

Collaboration

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