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Investigating the kaonic atoms and K^- nuclear absorption at low-energy: SIDDHARTA-2 and AMADEUS

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The SIDDHARTA-2 and AMADEUS collaborations aim to provide experimental information on the low-energy strong interaction between antikaons and nucleons. The investigation of the antikaons dynamics in nuclear medium is fundamental for understanding the non-perturbative QCD in the strangeness sector, with implications going from the domain of nuclear physics to astrophysics. The DAΦNE collider provides a unique source of monochromatic low-momentum kaons ($p_{\mathrm{K}} \sim 127\ \mathrm{MeV/c}$) from the ϕ-meson decay nearly at-rest, ideal to explore the interactions of the kaons at low-energy or to stop them in the targets. SIDDHARTA-2, which is the upgraded experiment of SIDDHARTA, studies the physics of kaonic atoms. The goal is to measure the X-rays emitted in the atomic transitions of the kaonic deuterium, the energy shift and the width of the 1s level will allow to extract for the first time the isospin dependence of the KbarN scattering amplitude at the energy threshold. AMADEUS explores the absorptions of the K^- in light nuclei (H, ^{4}He, ^{9}Be and ^{12}C) in order to extract information about the possible existence of kaonic bound states with nucleons and the properties of hyperon resonances in the nuclear environment. As a first step, the hadronic interactions of the negatively charged kaons with the materials of the KLOE detector, used as an active target, are investigated by reconstructing hyperon-nucleon/nuclei (YN) and hyperon-pion (Yπ) pairs emitted in the final state.

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