Contribution ID: **20** Type: **Presentazione orale**

Investigating the low-energy K^- interactions in nuclear matter with AMADEUS

Tuesday, 15 November 2016 18:45 (12 minutes)

Summary

AMADEUS is dealing with the study of the low-energy K^- interactions with light nuclei, with the aim to shed light on fundamental open issues concerning the non-perturbative QCD regime in the strangeness sector with implications going from particle and nuclear physics, to astrophysics (equation of state of Neutron Stars). AMADEUS takes advantage of the DAΦNE collider at LNF-INFN, which provides a unique source of monochromatic low-momentum kaons. In a first stage, the KLOE detector was used as an active target in order to obtain excellent acceptance and resolution data for K^- nuclear capture on H, ^{4}He, ^{9}Be and ^{12}C nuclei. The strength of the K^- binding in nuclei is currently under investigation through the study of the K^- multi-nucleon absorption processes in Λ/Σ - p,d,t channels, and the search for antikaon multi-nucleon bound states. We are also inquiring into the $(\Sigma\pi)^0$ channels to get information on the controversial $\Lambda(1405)$ resonance, and we are looking into the $\Lambda\pi^-$ channel to investigate the in medium properties of the $\Lambda(1405)$ and $\Sigma(1385)$ resonances. Future plans will also be discussed.

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Session Classification: Presentazioni giovani ricercatori: Dinamica dei quark e degli adroni e reazioni a molti corpi