HK 74: Invited Talks III

Time: Friday 9:45–10:45 Location: HBR 14: HS 1

Invited Talk HK 74.1 Fri 9:45 HBR 14: HS 1

Strange hadron spectroscopy at GlueX and beyond — •Peter Hurck — University of Glasgow, UK

Hadron spectroscopy has been successfully employed as a tool to study Quantum Chromodynamics for many years. While much progress has been made in the past in the study of states with the light up and down quarks and the heavy charm and bottom quarks, there has been little progress regarding states with strange quarks. For the baryon sector, a recent review on "Λ and Σ Resonances" in the PDG states that the "field is starved for data" [1]. The situation is similar for mesons. Several experimental campaigns are ongoing or in the planning stages to address this shortcoming and provide high quality data on hyperons and mesons with strange quarks.

The GlueX experiment, located at Jefferson Lab, studies the spectrum of hadrons using photoproduction on a LH2 target. With its detector system capable of measuring neutral and charged final state particles GlueX can measure many different hadrons containing strangeness. A linearly polarized photon beam allows the measurement of polarization observables, which contain information about the production mechanisms.

In this talk, the GlueX experiment is introduced, and recent progress of its strangeness program will be presented. In addition, prospects for strangeness measurements at other facilities, such as the KLong Facility at Jefferson Lab or AMBER at CERN, will be discussed.

[1] R.L. Workman et al. (Particle Data Group), Prog. Theor. Exp. Phys. 2022, 083C01 (2022) and 2023 update, Chapter 82.

Invited Talk HK 74.2 Fri 10:15 HBR 14: HS 1

Overview of LUNA project at LNGS — •Denise Piatti — University of Padua, Italy — INFN, division of Padua, Italy

Nuclear reactions shape the life and death of stars and they produce most of the chemical elements in the Universe. The cross section, at the energy of the Gamow peak, is a crucial ingredient to improve our knowledge on stellar and Universe chemical evolution. Its low value at stellar energies prevent direct measurements in earth-based laboratories. In recent years low energy data significantly improved thanks to underground facilities, pioneered by the Laboratory for Underground Nuclear Astrophysycs (LUNA).

LUNA started its activity in 1991 with a 50 kV electrostatic accelerator installed under Gran Sasso, which is a natural shield against cosmic rays ensuring a ultra low background environment. LUNA early activity was dedicated to reactions relevant to the Sun, and then, thanks to the installation of a new accelerator (LUNA400), it focused on the study of the Big Bang Nucleosynthesis (BBN) and of the CNO, NeNa and MgAl cycles.

LUNA is now facing the next steps, helium and carbon burning, thanks to the new 3.5MV accelerator, which has just started its activity at the Bellotti Facility of LNGS. The accelerator provides hydrogen, helium and carbon beams, allowing to study the reactions that shape both the evolution of massive stars to their final fate and the synthesis of most of the elements in the Universe.

In the talk I will provide an introduction to underground nuclear astrophysics, LUNA recent results, ongoing and future measurements.