

HK 10: Invited Talks

Time: Tuesday 11:00–13:00

Location: MED 00.915

Invited Talk HK 10.1 Tue 11:00 MED 00.915
Baryon scattering amplitudes from lattice QCD — •JOHN BULAVA — Ruhr Universität Bochum

Lattice QCD computations of baryon scattering amplitudes are continually improving. As a first-principles Monte Carlo approach, such simulations elucidate the quark mass dependence of baryon interactions, providing useful input to chiral effective theories. I will review computations of the nucleon-nucleon interaction at unphysically heavy quark masses, for which agreement has been recently attained between several independent groups. I will then present first results for light quark masses, which make contact to chiral effective theories for the first time.

Invited Talk HK 10.2 Tue 11:30 MED 00.915
Exploring Triaxial Deformation in Neutron-rich Nuclei — •KATHRIN WIMMER¹, BYUL MOON², and WOLFRAM KORTEN³ —
¹University of Cologne, Institute for Nuclear Physics, Germany —
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Understanding nuclear shapes far from stability is key to refining nuclear models. While many deformed nuclei are well described by axial symmetry, some isotopes require a triaxial description, where the nucleus lacks a single axis of symmetry. This triaxiality has long been debated, with contrasting theoretical models offering different interpretations. Neutron-rich Zr and Mo isotopes are ideal candidates to explore this question due to predicted shape coexistence and evolving collective structure.

To probe this, we performed a high-resolution in-beam γ -ray spectroscopy experiment at RIBF using the HiCARI array. Nucleon-removal reactions populated $^{108,110}\text{Zr}$ and $^{110,112}\text{Mo}$. Excited-state lifetimes were extracted via the line-shape method, and new level schemes were established, revealing characteristic signatures associated with triaxial deformation. The results, interpreted using modern theoretical models, provide new constraints on deformation in this mass region.

In this talk, I will present the experiment, discuss the results in detail, and provide an outlook for further studies of triaxial deformation

in neutron-rich nuclei.

Invited Talk HK 10.3 Tue 12:00 MED 00.915
Jet Targets for Nuclear and Hadron Physics Experiments — •ALFONS KHOUKAZ — Institut für Kernphysik, Universität Münster, 48149 Münster

Jet beams are widely used as targets in many fields of physics. Prominent examples are scattering experiments at hadron and lepton accelerators or at high-power laser facilities, where pure and windowless targets with adjustable thickness are required in vacuum. Depending on the specific experimental situation, different types of targets such as gas-jets, cluster-jets or pellet streams can be used to fulfil the required properties. However, in recent years new experimental challenges have emerged that require a significant improvement in the performance of existing target technologies and the development of new target beam generation and monitoring techniques. Inspired by this, new research projects have been initiated, focusing on the development of state-of-the-art jet targets. This talk gives an overview of the developments on cryogenic gas-jet, cluster-jet and frozen pellet/filament targets at the University of Münster.

Invited Talk HK 10.4 Tue 12:30 MED 00.915
Probing neutrinos with the KATRIN and LEGEND experiments — •SUSANNE MERTENS — Max-Planck-Institut für Kernphysik, Saupfercheckweg 1, 69117 Heidelberg

The absolute mass scale and fundamental nature of the neutrino remain among the most pressing open questions in astroparticle physics today. Beta decay experiments provide unique laboratory probes of these properties. In particular, the kinematics of single beta decay allow for a model-independent determination of the absolute neutrino mass. The KATRIN experiment currently sets the most stringent direct limit on this quantity. The observation of neutrinoless double beta decay would demonstrate that neutrinos are their own antiparticles. The LEGEND experiment is designed to achieve unprecedented sensitivity to this rare process. This talk will present the KATRIN and LEGEND experiments, highlighting recent results and outlining future prospects.