Symposium From QCD to Nuclei (SYNU)

gemeinsam veranstaltet von
dem Fachverband Physik der Hadronen und Kerne (HK) und
dem Arbeitskreis Beschleunigerphysik (AKBP)

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Übersicht der Plenarvorträge und Fachsitzungen

(Hörsaal S1/01 A1)

Plenarvorträge

SYNU 1.1	Di	9:00– 9:45	S1/01 A1	**Few Nucleon Systems from Lattice QCD** — •Martin Savage
SYNU 1.2	Di	9:45–10:30	S1/01 A1	**Uncertainty quantification and nuclear forces** — •Richard Furnstahl
SYNU 2.1	Di	11:20–12:05	S1/01 A1	**Recent Results in Nuclear Lattice Effective Field Theory** — •Dean Lee
SYNU 2.2	Di	12:05–12:50	S1/01 A1	**Atomic nuclei from effective field theories** — •Thomas Papenbrock

Fachsitzungen

SYNU 1.1–1.2	Di	9:00–10:50	S1/01 A1	**From QCD to Nuclei**
SYNU 2.1–2.2	Di	11:20–12:50	S1/01 A1	**From QCD to Nuclei**

SYNU 1: From QCD to Nuclei

Zeit: Dienstag 9:00–10:50 Raum: S1/01 A1

Plenarvortrag SYNU 1.1 Di 9:00 S1/01 A1

Few Nucleon Systems from Lattice QCD — •Martin Savage — Institute for Nuclear Theory, Seattle, Washington, USA

Remarkable progress is being made in using the numerical technique of lattice QCD to explore simple properties of light nuclei directly from the underlying theory of the strong interactions. After a brief introduction, I will present the status of lattice QCD calculations of few nucleon systems, including the magnetic moments and polarizabilities of light nuclei, and the cross section for the radiative capture process n+p to d+gamma. I will also present some new results for these light systems.

Plenarvortrag SYNU 1.2 Di 9:45 S1/01 A1

Uncertainty quantification and nuclear forces — •Richard Furnstahl — Ohio State University, Columbus, OH, USA

Rapid improvements in many-body methods for nuclear structure and reactions are enabling new confrontations with data from present and future experiments, which include precise and reliable mass measurements, explorations to the limits of nuclear existence, and studies of fundamental symmetries and neutrinos. These confrontations require robust theoretical uncertainty quantification (UQ). Increasingly, a dominant source of uncertainty is the input Hamiltonian. This is spurring improvements to the chiral effective field theory (ChEFT) of nuclear forces, which seeks a faithful low-energy representation of quantum chromodynamics in the form of a controlled expansion. The error in a calculated observable from omitted higher-order terms in the ChEFT expansion is an example of a systematic theory uncertainty. I will survey recent developments and future prospects for the formulation and optimization of chiral nuclear forces and related advances in theoretical UQ, including the application of Bayesian parameter estimation and model selection.

Grußworte von dem Präsidenten der TU Darmstadt, Professor Dr. Hans Jürgen Prömel, sowie von Staatssekretär Ingmar Jung aus dem Hessischen Ministerium für Wissenschaft und Kunst.

SYNU 2: From QCD to Nuclei

Zeit: Dienstag 11:20–12:50 Raum: S1/01 A1

Plenarvortrag SYNU 2.1 Di 11:20 S1/01 A1

Recent Results in Nuclear Lattice Effective Field Theory — •Dean Lee — North Carolina State University, Raleigh, USA

This talk reviews some recent progress made by the Nuclear Lattice Effective Field Theory Collaboration. In the first part I discuss an ab initio calculation of alpha-alpha scattering. This calculation uses a technique called the adiabatic projection method. In the second part I present evidence that low-density nuclear matter is near a quantum phase transition and discuss the consequences for the binding of protons and neutrons within nuclei.

Plenarvortrag SYNU 2.2 Di 12:05 S1/01 A1

Atomic nuclei from effective field theories — •Thomas Papenbrock — University of Tennessee, Knoxville, USA

In recent years, we have seen a transition toward precision calculations of nuclear properties. This progress is based on ideas and applications of effective field theory (EFT), the renaissance and new development of ab initio methods with an affordable computational cost, and the sheer availability of computational cycles. This talk reviews some of the recent developments including nuclear interactions from chiral EFT with accurate saturation properties, ab initio computations of neutron-rich calcium isotopes, and the description of vibrations and rotations in heavy nuclei with quantified theoretical uncertainties.