SYHB 2 Hans-Bethe Symposium II

Zeit: Montag 16:30–18:10 Raum: HV

Hauptvortrag SYHB 2.1 Mo 16:30 HV

Bethe's Legacy in Nuclear Physics: From Nuclear Structure to Nuclear Matter — •W. Henning — GSI, Wixhausen and J.W. Goethe Universität, Frankfurt

For more than seven decades Hans Bethe has made fundamental contributions to the understanding of matter that is governed by the strong - the nuclear - interaction. His seminal work in nuclear structure and nuclear matter work ranges from the understanding of the nuclear force, of few nucleon systems and their dissociation properties - and thus their relevance for nuclear reactions and nuclear astrophysics - to important aspects of many-body theory and to the properties of extended nuclear matter as, for example, found in supernovae and neutron stars. Some of the questions are still at the forefront of today's nuclear physics research, in particular when pushing nuclei and strong interaction systems to the extremes, such as in isospin and for nuclei far off stability, for highly compressed and excited nuclear matter, and for phase transitions involving new forms of matter.

Hauptvortrag SYHB 2.2 Mo 17:05 HV

Hans Bethe's Role in Solid State Physics — •H. Thomas — Universität, Basel

Hans Bethe started his scientific career with the theory of the newly discovered electron diffraction by crystals and with work on the electron theory of metals, but soon other areas attracted his interest. Nonetheless, his contributions to solid-state physics have had a lasting influence on this field. In particular, the famous "Bethe ansatz"used for calculating the eigenstates of the one-dimensional ferromagnet, including bound states of two or more spin waves, has proved to be a powerful tool for a large variety of problems and is very much alive today. Further, the "Bethe approximation"in the theory of order-disorder transitions, as well as the "Bethe lattice"for which it becomes the exact solution, have been and are being applied to a multitude of problems in statistical physics. And last but not least, the "Elektronentheorie der Metalle"by Arnold Sommerfeld and Hans Bethe in the Handbuch für Physik has been a source of wisdom for generations of solid-state physicists.

Hauptvortrag SYHB 2.3 Mo 17:40 HV

The Implication of Bethe's Equation to Radiation Biology and Therapy — •G. Kraft — GSI, Wixhausen und Technische Universität, Darmstadt

Bethe's theory of the passage of fast particles through matter explains the increase of particle interaction with decreasing velocity. This effect is the basis for a larger energy deposition at the end of macroscopic particle beams as used in tumor therapy.

The increase in interaction density in each particle track is in addition the reason for an enhanced production of local DNA damage yielding clusters of lesions. At a certain ionisation density the magnitude of clustered lesions exceeds the cellular repair capacity and yields cell death.

In carbon tumor therapy both effects, the high dose and the enhanced relative biological effectiveness in the tumor produce outstanding clinical results. In particle biology, heavy ions can be used to study the kinetics of DNA repair processes.