HK 56: Hauptvorträge IV

Zeit: Freitag 11:00–12:20 Raum: F 1

Hauptvortrag HK 56.1 Fr 11:00 F 1

The origin of low-lying collective E1 and E2 strength in atomic nuclei — •Mark Spieker — Institute for Nuclear Physics, University of Cologne

In the atomic nucleus, global isospin symmetry between the constituent protons and neutrons has often been considered as a feature of the strong interaction [1]. However, it is a well-known fact that rather local than global isospin symmetry is realized, see, *e.g.*, [2]. Low-lying collective E1 and E2 strengths provide a powerful tool to study the mechanisms by which isospin symmetry is fully or partly broken. In this talk two generating mechanisms of electric dipole and quadrupole collectivity below the particle-emission thresholds will be discussed. First, the α-cluster dipole mode, i.e. the dipole-type oscillation of an α-particle against the remaining bulk will be introduced as a possible generator of low-lying E1 strength in medium-mass and heavy nuclei [3]. Secondly, the comprehensive experimental study of E2 strength in the Sn isotopes will be presented to highlight the quadrupole-type oscillation of the neutron skin against the isopin-saturated core as a possible generator of low-lying E2 strength [4].

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[1] D.D. Warner, M.A. Bentley, P. Van Isacker, Nature Physics **2**, 311 (2006)
[2] F. Iachello, Phys. Lett. B **160**, 1 (1985)
[3] M. Spieker, S. Pascu, A. Zilges, F. Iachello, Phys. Rev. Lett. **114**, 192504 (2015)
[4] M. Spieker, N. Tsoneva *et al.*, Phys. Lett. B **752**, 102 (2016)

Hauptvortrag HK 56.2 Fr 11:40 F 1

Radionuclides for medical applications — •Ulli Köster — Institut Laue-Langevin, Grenoble, France

Ionizing radiation plays an important role in many medical applications. Not only the specialties radiology, radiotherapy and nuclear medicine rely on ionizing radiation, but also radioguided surgery, certain dermatology procedures, research and development of new pharmaceuticals, etc. Last but not least about half of all medical devices are sterilized by ionizing radiation before use.

The dominating radionuclides in diagnostic nuclear medicine are ^{99m}Tc for SPECT (single photon emission computed tomography) and ^{18}F for PET (positron emission tomography). These work horses are complemented by other diagnostic radionuclides with shorter or longer half-lives or different chemical properties to cover a wide range of applications. Therapeutic applications of radiopharmaceuticals were so far restricted to relatively rare diseases (e.g. thyroid cancer), but new targeted radionuclide therapies for different types of cancer and other diseases are now coming into clinical practice. The future holds great promise for *theranostics*, a type of personalized medicine where a targeted radionuclide therapy is individually optimized based on imaging with a companion diagnostic radiopharmaceutical. Such applications are ideally performed with so-called *matched pairs* of diagnostic and therapeutic radionuclides of the same chemical element.

The presentation will discuss medical applications of radionuclides and the respective production methods. A particular emphasis is made on synergies with nuclear physics research facilities.