

Polarised short-lived nuclei and excited states: a versatile tool for ISOLDE science

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In unstable nuclei or excited nuclear states spin polarisation leads to anisotropic distribution of emitted radiation, and modified cross-sections for Coulomb excitation or nuclear reactions. These effects can be used in a variety of ways in different fields of research. In the weak-interaction studies, they can contribute to searches for New Physics by measuring the asymmetry in beta decay of mirror nuclei. In nuclear physics, through angular correlations between emitted or scattered particles and emitted radiation, they can be used to determine spins and parities of excited nuclear states, which are often interesting also for astrophysics studies. In the form of ultrasensitive beta-NMR, they allow to measure precisely magnetic dipole moments and electric quadrupole moments for nuclear ground-states or long-lived isomers. The latter technique can be also used in material science, and since recently chemistry and biology. Asymmetric emission of gamma radiation might even be applicable in medical diagnosis.

In this contribution I will discuss briefly selected topics that can be addressed with spin-polarised nuclei, and I will concentrate on what would be required to extend the present polarised-beam capabilities in an upgraded or even a new ISOLDE experimental hall.

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