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Highlights from the ISOLDE Solenoidal Spectrometer

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Spectroscopy based on nuclear transfer reactions has been a workhorse for the investigation of nuclear structure for decades and motivated the construction of many high-resolution spectrometers around the world. However, extending this approach to reactions in inverse kinematics, required for most radioactive beams, comes with a loss of resolution due to kinematic compression and kinematic broadening. These problems can be overcome if the transfer reaction occurs inside a strong solenoidal field, which forces the ejectile on helical trajectories. By measuring the position as well as the energy of the ejectile, the excitation energy as well as the center-of-mass emission angle can be extracted. Angular distributions can be used to determine the amount of transferred angular momentum.

The ISOLDE Solenoidal Spectrometer (ISS) is making use of this highly versatile approach, allowing for a broad range of experiments motivated by, e.g., the evolution of nuclear shell structure, shape coexistence, nuclear astrophysics, and nuclear fission. In this presentation the experimental approach, available detectors as well as recent results will be discussed.

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