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# On the trail of low-lying isomeric states by Penning-trap mass spectrometry

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State-of-the-art optical clocks achieve precisions of 10–18 or better using ensembles of atoms in optical lattices or individual ions in radio-frequency traps. Promising candidates for use in atomic clocks are highly charged ions (HCIs) and nuclear transitions, which are largely insensitive to external perturbations and reach wavelengths beyond the optical range that are accessible to frequency combs. Most promising here are transitions between atomic or nuclear isomeric and ground states. However, insufficiently accurate atomic and nuclear structure calculations hinder the identification of suitable transitions in HCIs and nuclei. Here, we report on the possibility to measure the mass differences between the excited isomeric and ground states using state-of-the-art Penning-trap mass spectrometry. Relative mass uncertainties of 10-12 have been reached.

**Primary author:** BLAUM, Klaus (Max-Planck-Institut für Kernphysik)

**Presenter:** BLAUM, Klaus (Max-Planck-Institut für Kernphysik)

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