

Towards a nuclear clock: On the direct detection of the thorium-229 isomer

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The measurement of time has always been an important tool in science and society. Today's most precise time and frequency measurements are performed with optical atomic clocks. However, these clocks could potentially be outperformed by a nuclear clock, which employs a nuclear transition instead of an atomic shell transition for time measurement. Among the 176000 known nuclear excited states, there is only one nuclear state that would allow for the development of a nuclear clock using currently available technology. This is the isomeric first excited state of ^{229}Th . Despite 40 years of past research, no direct decay detection of this nuclear state has been achieved. In the presentation, measurements will be described that have led to the first direct detection of the isomeric decay in ^{229}Th , thereby paving the way for nuclear laser spectroscopy and the development of a nuclear clock.