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Mapping the $N = 40$ Island of Inversion with neutron-rich iron isotopes at TITAN

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Mass measurement facilities are extremely important in furthering our understanding of nuclear structure away from the valley of stability, including aiding in the search for collective behaviors in exotic nuclei. TRIUMF's Ion Trap for Atomic and Nuclear science (TITAN) is among the world's premier precision trapping facilities, with the newly added Multiple-Reflection Time-of-Flight Mass Spectrometer (MR-ToF-MS) expanding its reach. The TITAN MR-ToF-MS was used in the measurement of neutron-rich iron isotopes around $N = 40$. These masses are critical in investigating a potential Island of Inversion at $N = 40$, which has been supported previously in literature by increased collectivity seen in this region. In total, the masses of $^{67-70}\text{Fe}$ were measured, with ^{69}Fe and ^{70}Fe constituting first time measurements and ^{67}Fe and ^{68}Fe resulting in improvements over current literature uncertainties. The impact of these mass measurements on the presence of a surfacing Island of Inversion will be discussed.

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