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Results from the NSCL TOF Mass Measurement of Neutron-rich Isotopes of Argon through Iron[1] ZACHARY MEISEL, National Superconducting Cyclotron Laboratory / Michigan State University / Joint Institute for Nuclear Astrophysics, SEBASTIAN GEORGE, Max-Planck-Institut-fur-Kernphysik / National Superconducting Cyclotron Laboratory, NSCL TOF COLLABORATION —
A recent experiment at the National Superconducting Cyclotron Laboratory has resulted in an extension of the nuclear mass surface for neutron-rich isotopes of argon through iron. The time-of-flight technique was employed to experimentally determine the masses of several nuclei for the first time. Results include the identification of argon as the lowest even-Z element exhibiting the $N = 28$ shell closure, as well the uncovering of a relatively small odd-even mass stagger between ^{56}Ti and ^{56}Sc. The latter result yields strong Urca cooling when implemented in a state-of-the-art accreted neutron star crust reaction network. A strong ^{56}Ti–^{56}Sc Urca neutrino cooling layer makes shallow neutrino cooling in the crust of accreting neutron stars a strong and robust effect due to the copious production of $A = 56$ material in thermonuclear burning processes that occur at the accreted neutron star surface.

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