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Precision Mass Measurements of Neutron-Rich Rare-Earth Nuclei[1] RODNEY ORFORD, FRITZ BUCHINGER, McGill University, JASON CLARK, JEFFREY KLIMES, Argonne National Laboratory, MARY BURKEY, GUY SAVARD, University of Chicago, DMITRY GORELOV, KUMAR SHARMA, University of Manitoba — One of the open problems in nuclear astrophysics is the identification of the astrophysical site of the rapid neutron capture process (r process). Due to the lack of experimental nuclear data of neutron-rich nuclei far from stability, it remains difficult to constrain or judge the accuracy of r-process models and calculations. The Canadian Penning Trap mass spectrometer (CPT) is located in the CARIBU facility at Argonne National Laboratory where intense beams of neutron-rich isotopes are created from the spontaneous fission of a ^{252}Cf source. The implementation of a phase-imaging mass measurement technique (PI-ICR) at the CPT in conjunction with the MR-TOF mass separator at CARIBU has improved our experimental sensitivity by more than two orders of magnitude. Recently, PI-ICR was used to make the first direct mass measurements of a number of neutron-rich rare-earth isotopes near N = 100. The phase-imaging technique, and insights from these new masses into possible r-process sites will be discussed.

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