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A High Rigidity Spectrometer for the Facility for Rare Isotope Beams.¹

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The High Rigidity Spectrometer (HRS) will be the centerpiece experimental tool of the Facility for Rare-Isotope Beams (FRIB) fast-beam program. The fast-beam program has tremendous discovery potential, enabling experiments with beam intensities of a few ions per second or less through the luminosity afforded by thick targets. The high magnetic rigidity of the HRS (up to 8 Tm) will match the rigidities at which rare-isotope production yields at the FRIB fragment separator are maximum across the entire chart of nuclei and enable experiments with the most neutron-rich nuclei available at FRIB. Gain factors in luminosity of ten or more are achievable compared to running with existing spectrometers, which have a maximum rigidity of 4 Tm, with the highest gains for the most neutron-rich unstable isotopes. To enable a broad spectrum of experiments, the HRS will accommodate different ion-optical modes and provide the flexibility to run in coincidence with a diverse set of other detector systems, such as the Gamma Ray Energy Tracking Array (GRETA) and the Modular Neutron Array (MoNA-LISA). In the presentation, an overview of the scientific opportunities with the HRS and the present layout, based on ion-optical and magnet-feasibility studies, will be given.

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