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The High Rigidity Spectrometer for FRIB

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The Facility for Rare-Isotope Beams (FRIB) will be the world's premier rare-isotope beam facility, producing a large fraction of the isotopes predicted to exist [1, 2]. For FRIB's rare isotope beams, optimum production yields will be achieved at energies between 170 MeV/u and 200 MeV/u. To make full use of these beams a high-acceptance beamline and a spectrometer with adequate bending power is needed.

The High Rigidity Spectrometer (HRS) will build on and expand the capabilities of the current experimental program at the S800 Spectrograph and the Sweeper Dipole Magnet by combining a large-gap dipole sweeper magnet with a spectrometer stage, both of which will be designed to handle beams of up to 8 Tm magnetic rigidity.

This charged-particle bending power will be about twice that of the existing devices and thus a good match for the rare isotope beams that will be available with FRIB. It will also enable the study of very neutron-rich systems at optimum energies.

A key feature of the HRS will be the accommodation of detector systems for charged particles, neutrons, and gamma rays. This will enable coincidence measurements of reaction products that stem from a variety of reactions such as knockout, breakup, charge exchange or Coulomb excitation [3].

This presentation will highlight some of the scientific objectives to which the HRS will contribute, and offer details of the current pre-conceptual design ideas.

[1] J. Erler et al., Nature 486, 509 (2012) and references therein
[2] A. V. Afanasjev, S. E. Agbemava, D. Ray, P.Ring, Phys. Lett. B 726, 680 (2013)
[3] "HRS - a High Rigidity Spectrometer for FRIB" whitepaper, Ed. Alexandra Gade and Remco Zegers, http://people.nscl.msu.edu/~zegers/HRS_draft.pdf (December 2014)

*) In collaboration with the FRIB HRS working group.

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