Polarized electron/positron beams for rare isotope studies at FRIB

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Spin observables in electron scattering have proven to be critical to unravel some of the inner workings of the nuclear matter ranging from the role of multi-photon exchange to parton distribution functions. The comparison between positron and electron scattering off nuclei is not only one of the cleanest ways to probe the magnitude of higher order corrections to the Born approximation but also provides access to weak processes, thanks to the amplification due to their opposite charges. So far, only stable nuclei have been able to be investigated as no target exists to extend such studies for nuclei far from stabilities. On May 10, 2022, the Facility for Rare Isotope Beams (FRIB) started its operation on the campus of Michigan State University (East Lansing, MI, USA), thus becoming the most powerful facility to study such exotic nuclei with unprecedented reach. FRIB is expected to unravel more than 1,000 isotopes, allowing to perform spectroscopy along both the proton and neutron drip lines that will extend our current knowledge toward the heaviest known isotopes, a feat not possible before. Thanks to its 400 kW superconductive drive linac, two storage rings for its low (up to 12 MeV/u) and high (up to 200 MeV/u) energy beamlines are being investigated for nuclear and nuclear-astrophysics studies. Several couplings of electron linacs to rare isotope rings have been in the work around the world (e.g., DERICA, ELISE, SCRIT and others) for a while. However, only the 30 W SCRIT facility has been in operation since 2009. A similar effort was initiated in 2020 to evaluate such facility at FRIB that will utilize a compact system capable of delivering polarized electron and positron beams. We will report on the status of this project.