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Challenge of low energy, large emittance beams

The SESRI facility, known as the Space Environment Simulation and Research Infrastructure, was successfully completed in Harbin, China, in 2022. It stands as a comprehensive ion species facility exclusively dedicated to space environment simulation and associated scientific research.
During the design and construction phases of SESRI, two major challenges were encountered. To effectively tackle the issues presented by low-energy, large-emittance beams, the facility implemented a series of slow extraction schemes. Among these, the most crucial involved the gradual ramping of sextupole strength and the incorporation of dynamic bumpers. Addressing another challenge related to beam uniformity, extensive discussions were conducted on the correlations between waveforms and particle profiles measured on Multistrip Ionization Chambers (MICs). Subsequently, a feedback system was implemented, resulting in a remarkable improvement in beam uniformities to surpass the 95% mark.

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