Contribution ID: **116** Type: **Poster contribution**

Development of an isober separator using skew-induced betatron resonance in a multi-radio-frequency quadrupole

Tuesday, 21 October 2025 19:20 (1 minute)

We have developed a novel mass separator—the multi-radio-frequency quadrupole (MRFQ)—that exploits betatron resonance. A distinctive feature of the MRFQ is the deliberate application of a skew electric field to induce the strong sum resonance. It has been theoretically verified that isobar separation is possible by utilizing the sharpness of the induced resonance, and we fabricate a prototype of MRFQ and experimentally verify it. Its performance, including mass resolving power, has been evaluated with $^{40}Ca^{+}$, $^{40}Ar^{+}$, $^{44}Ca^{+}$, and $^{44}CO_2^{+}$ ion beams. The operating principle and detailed experimental results will be presented in the poster.

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Funding Agency

Classification

Low-energy and in-flight separators

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Session Classification: Poster Session

Track Classification: Low-energy and in-flight separators