



独立行政法人理化学研究所 仁科加速器研究センター  
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RIKEN Nishina Center for Accelerator Based Science  
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## Production of spin-controlled RI beams

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The degree of freedom of spin in quantum systems serves as an unparalleled laboratory where intriguing quantum physical properties can be observed, and the ability to control spin is a powerful tool in physics research. Recently, we have proposed a novel method to produce spin-controlled (aligned) RI beams, that is the two-step fragmentation method with the momentum-dispersion matching technique [1]. The method was verified in an experiment at the RIKEN RIBF, in which an RI beam of Al-32 with a degree of alignment of 8% was produced from a primary beam of Ca-48 via an intermediate product of Al-33. The figure of merit for the new method was found to be greater than that of the conventional method by a factor of more than 50. Such an ability to control spin, when applied to state-of-the-art RI beams, is expected to provide unprecedented opportunities for research on the nuclear structure of species situated outside the traditional region of the nuclear chart.

[1] Y. Ichikawa, H. Ueno et al., Nature Phys. 8 (2012) 918.

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