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Characterisation and mitigation of RF knockout

Monday 2 June 2025 16:00 (2 hours)

Beam stacking is a key advantage of Fixed Field alternating gradient Accelerators (FFAs) for high-intensity applications. During stacking, one beam is stored as a coasting beam at the extraction energy while another, incoming beam is accelerated. However, the beam loss mechanism termed RF knockout can occur during stacking and undermine gains in extracted beam current. The accelerating RF program of the incoming beam can cause cumulative displacements in the stored coasting beam and result in significant beam loss. To ensure that beam stacking is a viable technique to extract highest intensities from an FFA, methods to avoid the loss from RF knockout must be established. This study presents results from a series of experiments at the ISIS proton accelerator to characterise and, crucially, to mitigate RF knockout and ensure successful beam stacking with no loss.

Footnotes

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Author: JOLLY, Carl (Science and Technology Facilities Council)

Co-authors: LETCHFORD, Alan (Science and Technology Facilities Council); SEVILLE, Andrew (Science and Technology Facilities Council); ROGERS, Chris (Science and Technology Facilities Council); KELLIHER, David (Science and Technology Facilities Council); POSTHUMA DE BOER, David (Science and Technology Facilities Council); Dr LAGRANGE, Jean-Baptiste (Science and Technology Facilities Council); MACHIDA, Shinji (Science and Technology Facilities Council)

Presenter: JOLLY, Carl (Science and Technology Facilities Council)

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