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In-situ plasma processing on low-beta cavities at the Argonne Tandem Linac Accelerator System (ATLAS)

Tuesday 23 September 2025 14:30 (3 hours)

A method to enhance ATLAS low-beta superconducting cavities has been developed at Argonne National Laboratory in collaboration with MSU/FRIB, Fermilab, IJCLab, JLab, and BNL. At the center of the accelerator, a cryostat containing seven 72 MHz QWR installed in 2014 has world-leading performance for ion linacs at v/c˜0.1, though performance has been reduced by ˜20 % over the past decade due to contaminants. ATLAS operates over 6000 hours annually with a winter maintenance period, during which we aim to recover cavity performance through in-situ plasma processing. Cold testing on a spare 72 MHz QWR before and after fundamental mode plasma processing, using the real ATLAS coupler and an 80:20 Ar/O2 gas mixture, demonstrates remarkable improvements. We present experimental results of plasma processing on the spare cavity in both bench-top test and realistic test-cryostat environments. We include a system developed to prevent plasma formation in the coupler port.

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Yes

Footnotes

Funding Agency

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