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Semi-automatic robot assisted, clean assembly of PIP-II LB650 cavity string at CEA

Thursday 25 September 2025 11:00 (20 minutes)

Achieving optimal performance in SRF (Superconducting Radio Frequency) cavity assembly relies heavily on precise cleanroom processing, where contamination poses significant risks. Human activities, a major source of particle emissions in cleanrooms, not only threaten cavity cleanliness but also contribute to labor intensity and noise exposure. To mitigate these challenges, recent advancements in robotics offer promising solutions for automating critical steps in cavity assembly. In particular, a collaborative robot (cobot) implemented by CEA introduces automated processes such as coupler to cavity assembly, flange and bellows cleaning, and repetitive handling. The cobot, a FANUC CRX-25 6-axis arm mounted on a support frame, can operate independently and at night, significantly reducing assembly duration while ensuring consistent, reproducible results. By eliminating the need for manual operation in noisy, repetitive tasks, this cobot enhances both efficiency and technician safety, supporting higher cleanroom standards. This paper presents an overview of these automated processes, the cobot's implementation, the cavity RF cold test and the technical decisions shaping future developments in SRF cavity assembly.

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Footnotes

Funding Agency

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