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Status of robotics and automation in the SRF community and real applications

Thursday 25 September 2025 11:20 (20 minutes)

The performance of superconducting RF (SRF) cavities is extremely sensitive to contamination by particles on the SRF surface. To mitigate this, high-pressure rinsing (HPR) with ultra-pure water is performed after surface treatment, and cavity assembly is conducted in a cleanroom environment. However, even when cleanroom suits are worn, human involvement in these processes can still introduce particle contamination.

In recent years, significant advancements have been made in the development of work robots across industries such as automotive manufacturing, semiconductor technology, and medical care, leading to increased automation. The SRF community has also embraced this trend. For example, FRIB has implemented robots for HPR, and institutions like FNAL, KEK, and Saclay are exploring robotic solutions for cavity assembly. Looking ahead, the integration of artificial intelligence (AI) is expected to enable cavity assembly that is entirely free from particle contamination while also eliminating the risk of human error. This talk will provide an overview of robotic and automated technologies related to superconducting cavities, along with examples of their practical applications.

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Yes

Footnotes

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