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Experience with proton beam instrumentation during commissioning of the ESS superconducting linac

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In March 2025, the beam commissioning of the entire ESS linac commenced, supported by a diverse suite of instrumentation systems. This campaign followed the 2023 commissioning of the normal-conducting linac, which accelerated protons to 70 MeV. During the intervening period, the entire superconducting linac and the transport line to the tuning dump were installed. Several instrumentation systems underwent expansion, including the deployment of new position and phase measurement devices, current monitors, and beam loss detectors. In addition, various types of instruments saw beam for the first time, such as ionization profile monitors, fast wire scanners, beam stops, imaging systems, and an aperture monitor. The commissioning campaign culminated in the acceleration of first protons through the final drift tube linac tank (to 90 MeV), the superconducting spoke structures (to 216 MeV), and the medium-beta and high-beta elliptical structures (to >800 MeV). In this paper, we present the initial beam measurements, as well as verification of the protection functions and lessons learned from the experience.

Footnotes

Funding Agency

I have read and accept the Conference Policies

Yes

Author: SHEA, Thomas (European Spallation Source)

Presenter: SHEA, Thomas (European Spallation Source)

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