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The four beam destinations for the commissioning of the ESS Normal Conducting Linac

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The commissioning of the Normal Conducting Linac (NCL) of the European Spallation Source (ESS) in Lund (Sweden), started in September 2018 and was completed in July 2023.
The four NCL commissioning phases required the design, procurement, test, installation and operation of four distinct beam destinations in order to safely dump the proton beam and measure the current of protons with energy up to 0.075 MeV in the LEBT, up to 3.6 MeV in the MEBT, up to 21 MeV in the DTL1, and finally 74 MeV in the DTL4.

Each beam destination was operated under UHV, and designed to be as compact as possible while withstanding the Fast Tuning mode (62.5 mA, 5 μs, 14 Hz), and the Slow Tuning mode (62.5 mA, 50 μs, 1 Hz). The EPICS-based control system was fundamental for five main reasons: (1) the control of the motion in and out of the beam line, (2) the high voltage control in the [0, -1000 V] range, (3) the monitoring of the water cooling systems, (4) the proton current measurements and (5) the timing synchronization with the overall ESS NCL. Key milestones and measurements results are described to demonstrate the proton transport at the nominal current of 62.5 mA during each of the four commissioning phases.

Footnotes

Funding Agency

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