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Beam dynamics studies of cavity failures for the initial operation phase of the ESS superconducting linac

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The European Spallation Source (ESS) superconducting proton linac is currently undergoing commissioning. During the initial operation phase, the final beam energy will be about 800 MeV, reaching a 2 MW power. High reliability and availability are crucial for the success of the ESS science programs and thus operations will be maintained even with failures of main linac components such as cavities and quadrupoles, as long as ˜50 % of the intended power can be achieved. To this end, we developed beam optics strategies to address failures in the cavities of the superconducting linac. Due to the constraints in the RF cavity amplitudes, we implemented a modified version of standard cavity compensation techniques. The results indicated that this strategy enables beam recovery that meets the beam quality specifications, thereby enhancing the availability of the ESS linac.

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Yes

Footnotes

Funding Agency

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