Reliability and Fault-tolerance strategy in the MYRRHA superconducting linac

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The MYRRHA project aims at the construction of a new irradiation complex in Mol (Belgium) to demonstrate the transmutation feasibility with an Accelerator Driven System (ADS). In its subcritical configuration, the MYRRHA facility requires a proton flux with a maximum power of 2.4 MW (600 MeV - 4 mA). Such a continuous wave beam will be delivered by a superconducting linac which must fulfil very stringent reliability requirements to ensure the safe ADS operation with a high level of availability. As a consequence, the number of beam interruptions will have to remain extremely low: the present maximum limit is set to 10 beam interruptions, longer than 3 seconds, per 3-month operating cycle. It leads to a global accelerator MTBF (Mean Time Between Failures) of ~ 250 hours.

In this purpose, the accelerator design is based on a redundant and fault-tolerant scheme to enable rapid failures mitigations. The MYRRHA project and its accelerator design will be briefly reviewed. Then, the adopted reliability strategy for the proton linac and dedicated studies on the subject will be presented. The consequences on the beam dynamics and on the R&D will also be discussed.

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