LIPAc Control Systems: a Reliability approach

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A Li (d,xn) fusion relevant neutron source with a broad peak at 14 MeV is indispensable to characterize and qualify suitable structural materials for the plasma facing components in future fusion reactors. LIPAc (Linear IFMIF Prototype Accelerator), presently under its installation and commissioning phase in Rokkasho, will validate the concept of a 40 MeV deuteron accelerator with its 125 mA CW and 9 MeV deuteron beam for a total beam average power of 1.125 MW.

Being LIPAc a prototype accelerator, reliability figures were not formally assessed during the design stages. Currently, with the growing necessity of suitable materials to meet world fusion roadmaps, LIPAc's potential upgrade towards the required neutron source is under consideration. This paper introduces the present study to identify potential issues that could cause downtimes.

The LIPAc Control Systems are designed and delivered by three European institutes (CEA, CIEMAT and INFN) for the Local Control Subsystems and by the Japanese Atomic Energy Agency for the central systems (machine protection and personal protection systems, Timing and all EPICS central services). This paper identifies the potential vulnerabilities on the already designed systems, and proposes, based on a practical approach, the necessary improvements to increase the availability figures of LIPAc.

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