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## IFMIF/EVEDA 125mA CW 9 MeV D+ Linac alignment status and potential improvements

IFMIF (International Fusion Material Irradiation Facility) will be a Li(d,xn) neutron source providing equivalent neutron spectrum of DT fusion reactions and comparable neutron flux of future commercial reactors. Such a facility is an essential step in world fusion roadmaps to qualify suitable structural materials capable to hold the unrivalled neutron irradiation inside the nuclear vessel of a fusion reactor. IFMIF, presently in its EVEDA (Engineering Validation and Engineering Design Activities) phase is installing LIPAc (Linear IFMIF Prototype Accelerator) in Rokkasho (Japan), a 125mA CW 9MeV deuteron beam as validating prototype of IFMIF accelerators. Beam dynamics calculations demand accuracies and precision of alignment within  $\pm 0.1$  mm in an assembly hall of about 8x40 m to keep beam losses below defined threshold and allow future hands-on maintenance activities. According to the F4E QA metrology handbook, a ratio of 5 between tolerance and uncertainty is acceptable. A network of about 130 fiducials currently exists in the assembly vault. In order to optimize installation schedule and reduce as much as possible potential risk on the alignment process, we decided to test and validate the assembly and alignment of each subsystem when possible before the delivery to Japan. The results of these campaigns as well as some potential improvements related with the utilization of photogrammetry technique and displacement sensors to monitor all the accelerator line will be presented in this paper. IFMIF (International Fusion Material Irradiation Facility) will be a Li(d,xn) neutron source providing equivalent neutron spectrum of DT fusion reactions and comparable neutron flux of future commercial reactors. Such a facility is an essential step in world fusion roadmaps to qualify suitable structural materials capable to hold the unrivalled neutron irradiation inside the nuclear vessel of a fusion reactor. IFMIF, presently in its EVEDA (Engineering Validation and Engineering Design Activities) phase is installing LIPAc (Linear IFMIF Prototype Accelerator) in Rokkasho (Japan), a 125mA CW 9MeV deuteron beam as validating prototype of IFMIF accelerators. Beam dynamics calculations demand accuracies and precision of alignment within  $\pm 0.1$  mm in an assembly hall of about 8x40 m to keep beam losses below defined threshold and allow future hands-on maintenance activities. According to the F4E QA metrology handbook, a ratio of 5 between tolerance and uncertainty is acceptable. A network of about 130 fiducials currently exists in the assembly vault. In order to optimize installation schedule and reduce as much as possible potential risk on the alignment process, we decided to test and validate the assembly and alignment of each subsystem when possible before the delivery to Japan. The results of these campaigns as well as some potential improvements related with the utilization of photogrammetry technique and displacement sensors to monitor all the accelerator line will be presented in this paper.

### Summary

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