Contribution ID: **18** Type: **oral**

The improvement in reliability of RF system of Linear IFMIF Prototype Accelerator (LIPAc)

Thursday, 14 November 2019 14:00 (30 minutes)

The Linear IFMIF Prototype Accelerator (LIPAc) to accelerate a 9 MeV deuteron beam at 125 mA in CW is under commissioning in Rokkasho, Japan, in order to validate the low energy section of the 40 MeV IFMIF accelerator under the Broader Approach Agreement in the field of fusion energy research between Japan and EURATOM. The LIPAc RF system for RFQ consists of eight RF chains, whose maximum output power are 200 kW each in CW at 175 MHz. The RFQ is designed to accelerate a deuteron beam of 125-130 mA from 0.1 MeV to 5 MeV in CW, which demands a total RF injected power of about 1.2 MW in CW. During the RF conditioning of the RFQ up to the deuteron acceleration level starting from July 2017, we faced difficulties for increasing RF power due to the unexpected high reflected power from the RFQ to the eight RF chains and the requirement of the short pulse and high repetition rate operation for the RF conditioning. During the two experimental campaigns a drastic maintenance was carried out, and resulted in overcoming the difficulties and succeeding to perform the deuteron beam commissioning in the low duty cycle. The experience and the lesson learnt will be presented so as to provide some hints to build a similar high power accelerator facility.

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Session Classification: Accelerator Systems

Track Classification: Accelerator System