Status of the FAIR Proton Linac

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Introduction

The 70 MeV FAIR Proton Linac [1] has to provide the primary beam for the production of antiprotons. It will deliver from 35 to 70 mA protons for the injection into the SIS18 with a repetition rate of 4 Hz. The accelerator will be located north of the existing UNILAC complex. Its conceptual layout is shown in Fig. 1 and its main beam parameters are listed in Tab. 1.

Tab. 1: Main parameters of the proton linac for FAIR.

Final energy	70 MeV
Pulse current	70 mA
Protons per pulse	$7 \cdot 10^{12}$
Repetition rate	4 Hz
Trans. beam emittance	4.2 µm (tot. norm.)
Rf-frequency	325.224 MHz

In-Kind Contributions

The design of the LEBT has started and the production of the focusing solenoids was completed. The mechanical integration of the chopper is currently under discussion. Beam dynamics simulations have been performed for different integration scenarios. The kickoff even for the production of the klystrons took place in January 2013, while several components of the RF test bench have been already delivered and installed at GSI. The magnets located in the transfer channel are already at GSI as well.

A timetable for the production of the CH cavities was proposed by CNRS in collaboration with CEA. The contract concerning the production of those cavities will be signed soon.

Concerning the RFQ structure, currently R&D activities are ongoing at the Frankfurt University. Alternative solutions to the 4-rods option are presently under investigations. The contract with IAP is under preparation.

Civil Construction

The general design of the building including shielding and location of the RF system has been completed. Addional shielding material had to be located close to the transfer channel to reduce the radiation level coming from the SIS18 during operation.

Cavities

The prototype cavity (Fig. 2) [2] has been tested at the Frankfurt University. The desired resonance frequency and field distribution were achieved during the bead pull measurements campaign. The stainless steel stems and drift tubes were produced at IAP and later polished at GSI. The welding of those components into the outer cylinder will start in February 2013. Copper-plating is planned for summer followed by high power-rf testing at the dedicated cavity test stand.

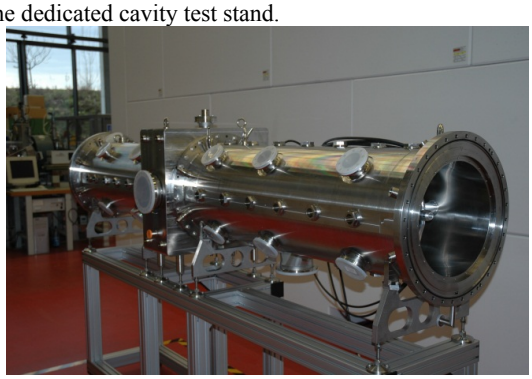

Figure 2: Prototype CCH-cavity (2.7 m)

Currently, the design of high power coupling loop is performed at GSI. RF simulations of the other cavities are ongoing. Within September all the specifications for the production of the technical drawings will be completed. A collaboration contract within GSI and the University of Frankfurt will be prepared shortly.

BPM / Phase Probes

RF simulations were performed to reduce the noise coming from the RF level and to compare that noise with the signal generated by the beam. Those simulations were performed for different energies and for different beam currents. The final design of the BPM has to be completed as soon as possible.

References

[1] *Technical Report "Proton Linac"*, https://edms.cern.ch/document/994418/1

[2] G. Clemente et al., PRST-AB **14**, 110101, (2011)

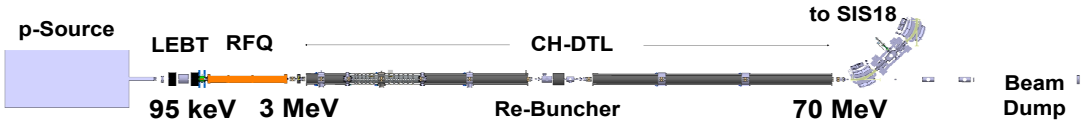

Figure 1: Conceptual layout of the FAIR proton Linac.

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