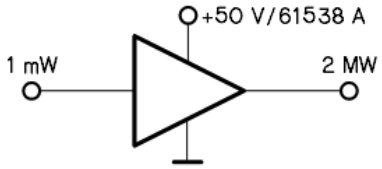
Twelfth Continuous Wave and High Average Power RF Workshop



12.-14.9.2022
CERN
Geneva, Switzerland
http://cern.ch/CWRF22

Contribution ID: **32** Type: **Oral presentation 20' + 5'**

Status of the HIPA rf-system at PSI

Monday, 12 September 2022 09:00 (25 minutes)

The High Intensity Proton Accelerator (HIPA) facility at PSI delivers a proton beam of 2 mA during routine operation and was tested up to 2.4 mA. The acceleration includes three stages: a Cockcroft-Walton, the Injector 2 cyclotron and the Ring cyclotron.
The injector 2, commissioned in 1984, is a separated sector cyclotron with 4 sector magnets and 4 sections cavities. Two 50 MHz cavities provide the main acceleration voltage, assisted by two 150 MHz Flattop cavities today routinely operated in accelerating mode. To increase the energy gain per turn, we are currently replacing these two systems with 50 MHz cavities. This ongoing upgrade program includes the replacement of the old LLRF and amplifier system. This talk will give an overview on the present state of this project.
The Ring cyclotron is a separated sector cyclotron with a fixed beam energy of 590 MeV, built by PSI and commissioned in 1974. The last major upgrade was the replacement of the four main aluminum cavities by copper cavities from 2004 to 2008. The IMPACT project, under planning at PSI, foresees a major upgrade on the Muon-Targets side of the facility. With this new project, the HIPA facility should be operated for additional 15 years. To compensate for the beam intensity losses caused by IMPACT on the target of the spallation source SINQ, the delivered beam intensity of the cyclotron should be increased by about 15%. Today the old 150 MHz flattop cavity system is the main limitation factor toward an increase of the beam current in the Ring cyclotron, and a power upgrade of the 50 MHz amplifiers also seems necessary. Therefore the pre studies for two rf-projects have been started. The first one will replace the existing flattop cavity by a new one, including a new LLRF, amplifiers and transmission line. The second one is to renew the LLRF and amplifiers for the four 50 MHz copper cavities. First concepts will be presented during this talk.

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Session Classification: Facility status reports #1

Track Classification: Facility status reports