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DAEdALUS Superconducting Ring Cyclotron To Deliver 10 mA Proton Beam at 800 MeV

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An accelerator module based on an injector cyclotron and a Superconducting Ring Cyclotron (SRC) able to accelerate H_2^+ at energy of 800 MeV/amu and with peak current of 5 mA is presented. The use of a H_2^+ molecule beam has three main advantages: 1) it reduces the space charge effects, 2) because of the stripping extraction it simplifies the extraction process w.r.t. single turn extraction and 3) we can extract more than one beam out of one SRC.

This module is forecasted for the DAEdALUS (Decay At rest Experiment for $\bar{\nu}_{cp}$ At Laboratory for Underground Science) experiment, which is a neutrino experiment proposed by groups from MIT and Columbia University. This experiment needs three accelerator modules able to deliver about 1.6 MW, each one, when operated with a duty cycle of 20%.

Extensive beam dynamics studies have been carried out over the last two years and have proved the feasibility of the design.

The superconducting magnetic sector of the SRC is calculated with the TOSCA module of OPERA3D. The main features and the beam dynamic along the SRC acceleration, without and with space charge effects, are presented.

Please indicate preferred presentation (poster or talk?)

talk

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