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28 GHZ OPERATION OF THE SUPERCONDUCTING ECR ION SOURCE VENUS

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Abstract

The VENUS ECR ion source has been commissioned at 18 GHz and operation at 28 GHz will begin in May 2004. The VENUS project goals are to produce high current medium charge state beams such as 240 eμA of U³⁰⁺ for the RIA driver linac and to produce low current, very high charge state beams such as 5 eμA of U⁴⁸ for the 88-Inch Cyclotron. During the commissioning phase with 18 GHz, tests with various gases and recently metals have been performed with up to 2 kW RF power and the performance is very promising, especially since more power is needed for optimum results. For example, 1100 eμA of O⁶⁺, 180 eμA of Ar¹²⁺, 160 eμA of Xe²⁰⁺, 160 eμA of Bi²⁵⁺ and 100 eμA of Bi³⁰⁺ were produced. The emittance of the beams produced at 18 GHz was measured with a two axis emittance scanner. A 10 kW, 28 GHz gyrotron system has been tested by the vendor and is being installed at the 88-Inch Cyclotron. The design and fabrication of the 28 GHz waveguide to couple the gyrotron to VENUS is also complete. Testing at 28 GHz will begin with gases and then be extended to metal beams using a high temperature axial oven. The two axis scanner will be used to measure the emittance of the beams.

The performance of the VENUS ion source at 18 and 28 GHz, low energy beam transport (LEBT) and beam emittance measurements will be described in the paper.