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Development of the superconducting ECR ion source VENUS for the RIA Driver LINAC

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The Rare Isotope Accelerator (RIA) linac driver requires a great variety of high charge state ion beams with up to a magnitude higher extracted beam intensities than currently achievable. For this purpose, the 28 GHz superconducting ECR ion source VENUS is currently under development at the Lawrence Berkeley National Laboratory. The goal of the RIA injector R&D program for VENUS is the reliable production of intense medium charge state ion beams, e.g. 8 eμA of U³⁰⁺, about six times the performance record held by the LBNL AECR-U.

The seven year project has made substantial progress in the last 2 years. During 2003 the VENUS ECR ion source was commissioned at 18 GHz, while preparations for 28 GHz operation were being conducted. Record ion beam intensities have been extracted at 18 GHz. For example 160 eμA of Xe²⁰⁺, 160 eμA of Bi²⁵⁺, 11 eμA of Bi⁴¹⁺ were produced. In May 2004, 28 GHz microwave power has been coupled into the VENUS ECR ion source for the first time. The paper will briefly describe the design of the VENUS source and its beam analyzing system. First results at 28 GHz operation, including first emittance measurements, will be presented.