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Status of ECR Ion Sources for the Facility for Rare Isotope Beams

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The Facility for Rare Isotope Beams (FRIB) is currently under construction at Michigan State University. Once operational the superconducting heavy ion linac will accelerate all the stable isotopes above 200 MeV/u with a beam power of up to 400 kW. The ion beam will be generated with one of two Electron Cyclotron Resonance (ECR) ion sources that are planned for the facility. Ahead of the commissioning schedule, the first ECR ion source and associated equipment are planned to be moved in the coming months to the front end area of FRIB and to be ready to deliver beam by the end of 2016. Operating at 14 GHz, this first ECR will be used for the commissioning and initial operation of the facility but will not be sufficient to reach the final beam power on the fragmentation target. A high performance ECR ion source is in development to reach high intensity of high charge state heavy ion beam such as uranium. A superconducting magnet structure compatible with operation at 28 GHz for this ion source has been designed at Lawrence Berkeley National Laboratory by the Superconducting magnet group and preparations for the construction are underway. Although the magnetic performances and most of the magnet components are very similar to the ones used with the VENUS magnet, the support structure of the FRIB ion source uses an innovative design that incorporates adjustable keys allowing for a precise adjustment of the sextupole preload minimizing the risk of failure and will provide significant operational margin. This ion source however will be first operated at 24 GHz with a 10 kW gyrotron recently tested successfully with NSCL SuSI ion source. The paper reviews the overall work in progress and development done with ECR ion sources for FRIB.

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