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Recent Progress of the Movable Vlasov Launcher at Institute of Modern Physics

To investigate the coupling efficiency between microwave with frequency above 20 GHz and plasma in an electron cyclotron resonance (ECR) ion source, a movable Vlasov launcher has been developed at Institute of Modern Physics (IMP). The beam intensity and axial bremsstrahlung were simultaneously measured with SECRAL-II (Superconducting ECR ion source with Advanced design in Lanzhou No. II) ion source at different positions of the Vlasov launcher. The experimental results clearly demonstrate that the position of the Vlasov launcher has significant impact on the beam intensity as well as charge state distribution (CSD), which indicates a variation of the produced beam intensity by a factor of 5 when the launcher is moved along the off-axis position. Meanwhile, it is shown that the bremsstrahlung spectrum counts within an energy range of 1-20 keV are particularly sensitive to the position of the Vlasov launcher, which implies that changing the position of the Vlasov launcher will modulate the electron energy distribution function (EEDF) and promising microwave coupling efficiency with regards to highly charged ion beam production could be achieved at the optimum position where more warm electrons are produced. This study will have a fundamental impact to the microwave coupling scheme of the third generation ECR ion sources and thus give a new insight into the design of microwave coupling scheme for the fourth generation ECR ion sources.

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Yes

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