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Experimental Investigation of Electron Cyclotron Instabilities in a Minimum-B ECR Plasma

To investigate the trigger mechanism of electron cyclotron instabilities in highly charged electron cyclotron resonance ion source (ECRIS), the microwave emission, wall bremsstrahlung and beam current signals were synchronously measured on SECRAL-II (Superconducting ECR ion source with Advanced design in Lanzhou No. II) ion source with various magnetic field configurations. The experimental results show that Bmin is the primary magnetic field parameter affecting the appearance of electron cyclotron instabilities, but not the only one; Binj, Bext and Br also affect the appearance of electron cyclotron instabilities. The trigger of electron cyclotron instabilities is a combined effect of multiple magnetic field parameters, the physical mechanism behind experimental observation is discussed in this talk.

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