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Cutoff Limitation of Left-Hand Polarization Wave and Candidates for Further Enhanced Producing Multicharged Ions on ECRIS

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Based on experimentally obtained plasma parameters in ECRIS and theoretical considerations, it turned out the essential factor that is currently presumed to define the increase in multicharged ion current in ECRIS is not simply the density limit of ordinary wave and right-hand cut-off, but is also higher density one of left-hand cutoff in magnetic field. There are two response guidelines that can be considered to make it possible to overcome limitations, except for the conventional simply increasing the frequency and the magnetic field strength. One is advanced high-frequency resonance, which is conversion from electromagnetic to electrostatic wave essentially without cut-off. The other is due to the introduction of lower frequency waves than ECR's one, which has no density limit in a more essential sense. The latter is the introduction of lower hybrid resonance and ion cyclotron resonance. We will describe experimentally obtained plasma parameters, and will discuss these applications.

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