ION CYCLOTRON RESONANCE HEATING IN A PLATEAU-ECRIS

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Abstract

It is shown why static or low frequency electric fields perpendicular to the magnetic field can penetrate into a magnetized plasma of high density. A configuration of electrodes is chosen for the application of radio-frequency electric fields to heat by ion-cyclotron-resonance (ICR) Ar(q+)-, H-, and He-ions in PECRIS V with a magnetic plateau and a great resonance volume. It is shown that all ions ICR-heated in this resonance volume gain rotational energy E(rot) and stay thus better confined leading to a drop so that their extracted currents. E(rot) of these ions thermalizes while they are further ionized by electron collisions so that the extracted currents of Ar((q+n)+)-ions do show a considerable increase with 2<n<7. The extracted currents of the two ICR-heated light ions do show only drops which will be discussed in detail. As proof of their gain of E(rot) the energy gain of extracted He-ions has been measured. The ICR-heating of multi-charged ions may thus be a technique to considerably improve the currents of the highest charge states.

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