# Trapped electrons studies of an ECR ion source with new magnetic topology

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The current generation of ECR ion sources used to produce beams of high charge state (HCS) ions have performance limitations due to in-homogenous star shaped beams as a radial multipole confinement magnets and mechanical limitations on scale up to high frequencies. A 10GHz ECR ion source (PK-GANESA) with a new magnetic topology has been developed in a GANIL – Pantechnik collaboration [1] to address these issues. Experimental investigation of the device provided no evidence on the production of HCS ions. To investigate the reason for this behavior, the performance of this source has been analyzed through simulations of electrons prior to collisions for 20µs using TrapCAD, a code which computes the tracking of electrons inside the magnetic-field map as well as the electron acceleration due to the electric field of the injected microwave. The electron-energy distribution function (EEDF) obtained from the simulations has been characterized with respect to radio-frequency, heating power, and simulation time. The simulation results have demonstrated an improvement of electron confinement (~10 times) with increasing RF heating when compared to a more traditional 10 GHz ECRIS (NANOGAN3) [2] present at GANIL, with simulation parameters normalized to electron density. In addition, an interpretation has been established for the poor experimental performances of the source, opening new ideas to improve significantly them. This contribution will deal with the results obtained from the simulations and their implications with regard to the PK-GANESA source.

**Références**

[1] P. Salou et al., AIP Conference Proceedings 2011, 040021 (2018)
[2] A.C.C. Villari et al., Nuclear Instruments and Methods in Physics Research B I26 (1997)

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