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## **Redefining Plasma Chambers for ECR Ion Sources: the IRIS Structure**

*Thursday 23 September 2021 09:50 (20 minutes)*

One possible way to optimize microwave coupling and plasma confinement in ECR Ion Sources is a revolutionary design strategy of plasma chambers, breaking the cylindrical symmetry. This contribution reports about the design and numerical validation of an innovative resonant cavity playing as plasma chamber of ECR ion sources. The new chamber, named IRIS (Innovative Resonators for Ion Sources), was argued starting from the 3D structure of the plasma and, therefore, fashioned to the twisting magnetic structure. The microwave launching scheme was radically changed as well, consisting of side-coupled slotted-waveguides with diffractive apertures smoothly matching the overall structure of the camera. This approach also enables a profound optimization of cooling systems and overall spaces in general (for gas feedings, oven systems, sputtering, etc.). Here we report on the conceptual study, electromagnetic design and PIC simulations of the electron heating in the novel resonant cavity, comparing results with those for standard (cylindrical) chamber, and also considering the impact of microwave feeding led by single aperture rectangular waveguides vs. waveguide-slotted antennas. Manufacture strategy, based on additive manufacturing techniques, will also be discussed.

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