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Circular, Spiral and Point-like Filamentation of a Magnetized, Radio Frequency Discharge U. KONOPKA, Auburn University, P. BADY-OPADHYAY, Max Planck Institute for Extraterrestrial Physics, D. SHARMA, Institute for Plasma Research, E. THOMAS, Auburn University, G.E. MORFILL, Max Planck Institute for Extraterrestrial Physics — In a cylindrical radio frequency (rf), low pressure discharge experiment, we investigated the plasma homogeneity while an external magnetic field was varied from 0 to 2 Tesla. The plasma was quasi homogeneous for cases of zero or low magnetic fields. With increasing field, close to and above the ion magnetization limit, the discharge became more and more distorted. The emerging inhomogeneities became first noticeable as a set of circular shaped, plasma light emissions that were aligned to the electrode confinement geometry on the outside and centered on the electrodes. The filamentation structures were very stable in time but could slowly expand or contract in size depending on the exact conditions. At higher fields a transition to slowly rotating plasma spirals was observed, sometimes even double or triple spirals. At very high fields, beyond the ion magnetization threshold, the spirals themselves split-up into many, point-like filaments aligned with the magnetic field. We demonstrate that the different kinds of filamentation can be explained by a combination of the cross magnetic field diffusion of the plasma and a spatially independent coupling of the RF power generation efficiency.

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