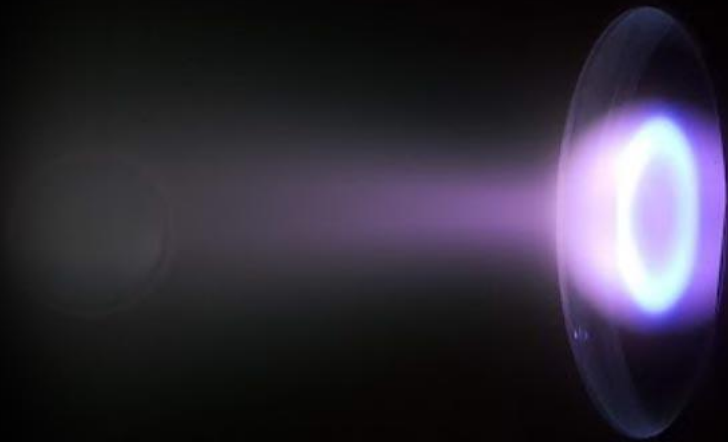
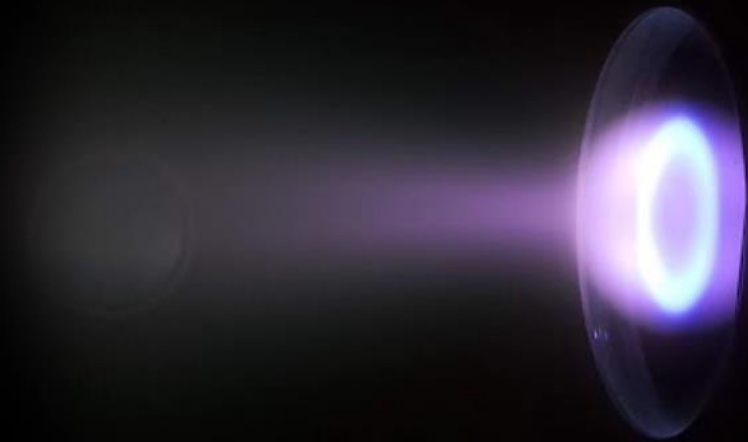


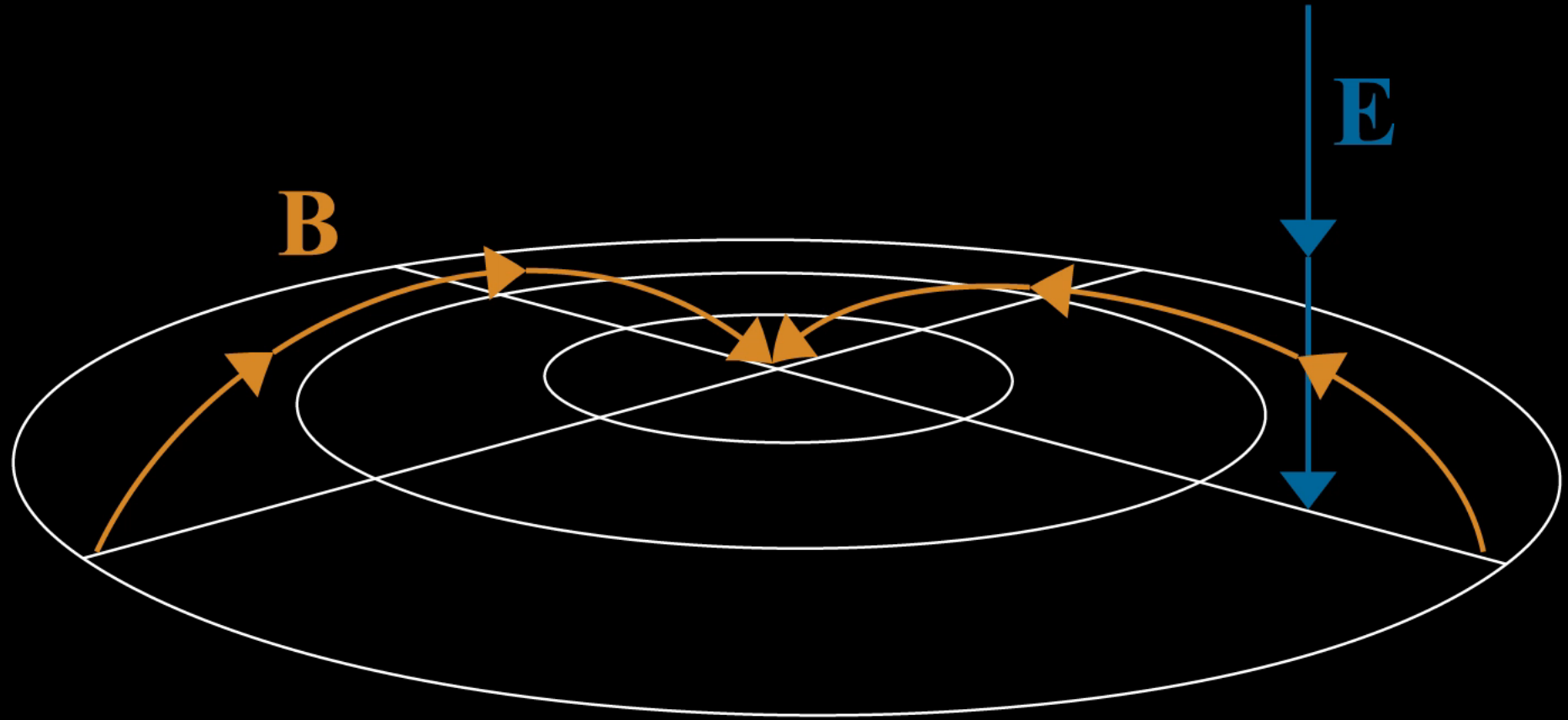
Spatial and time-resolved characterization of HiPIMS spokes

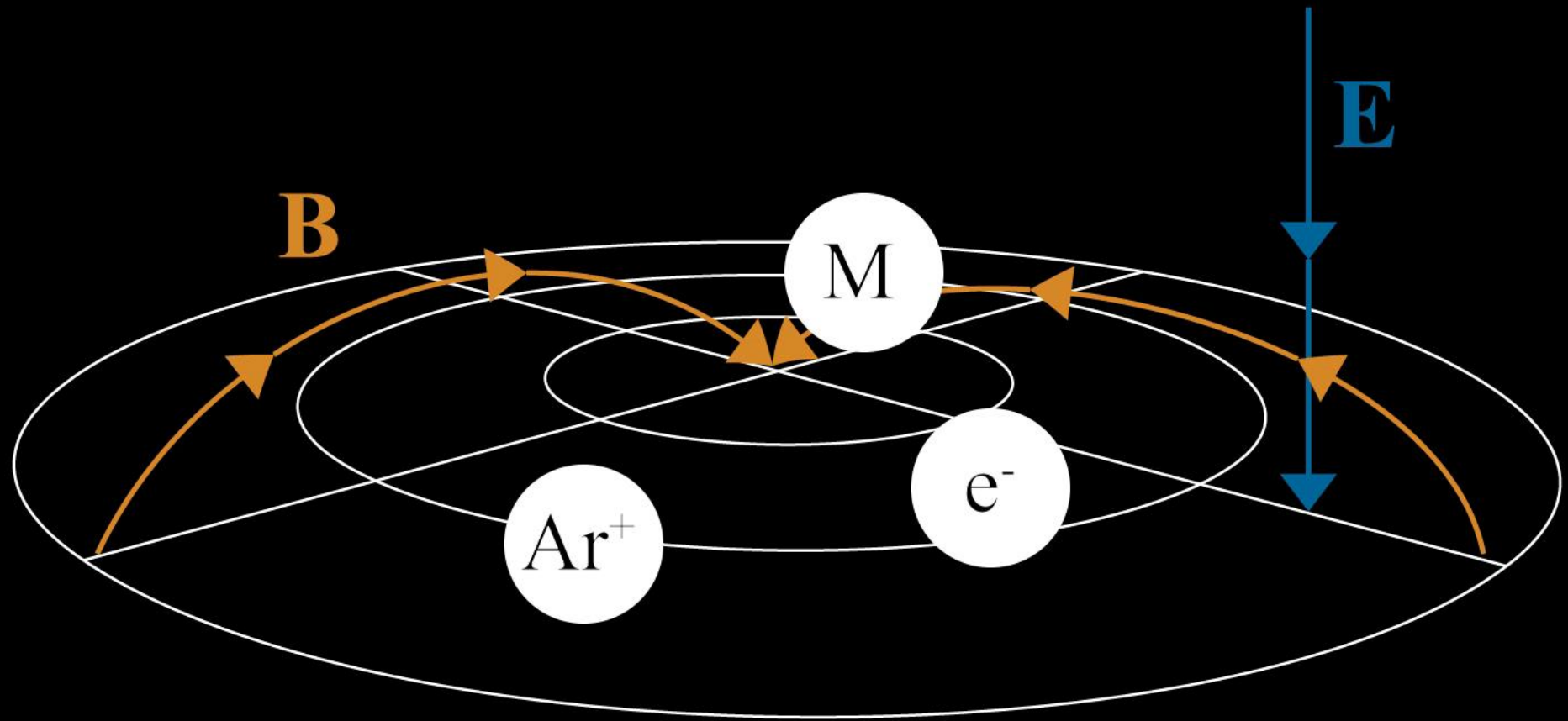
Alex Chang, Lénïac Couêdel, Michael Bradley
Department of Physics and Engineering Physics

2020 CAP Congress DPP
June 2020

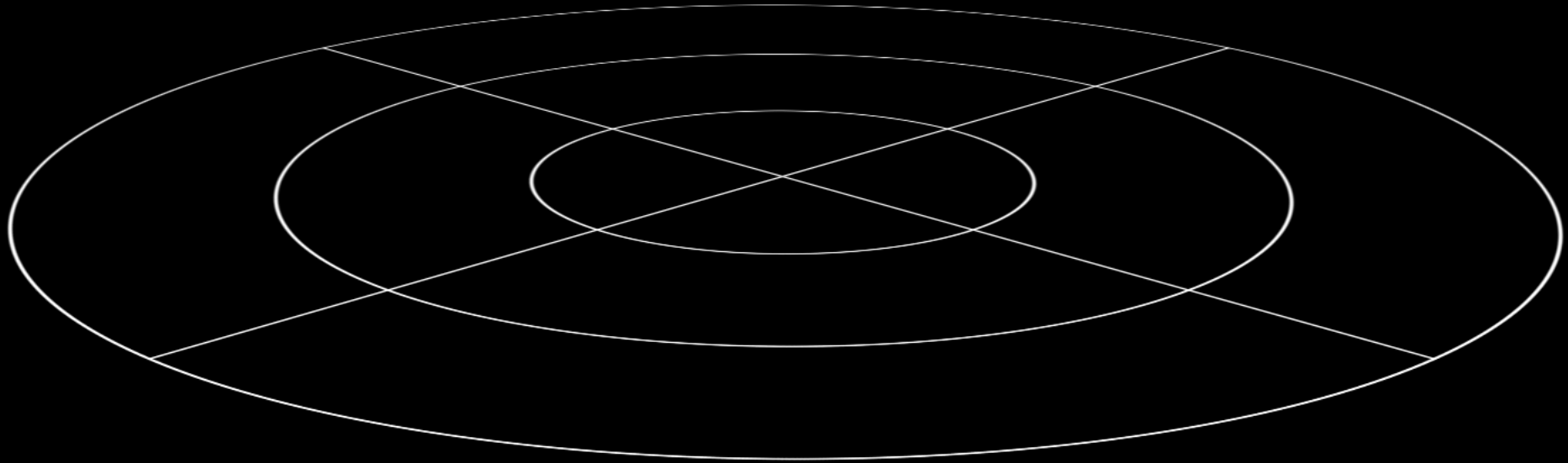


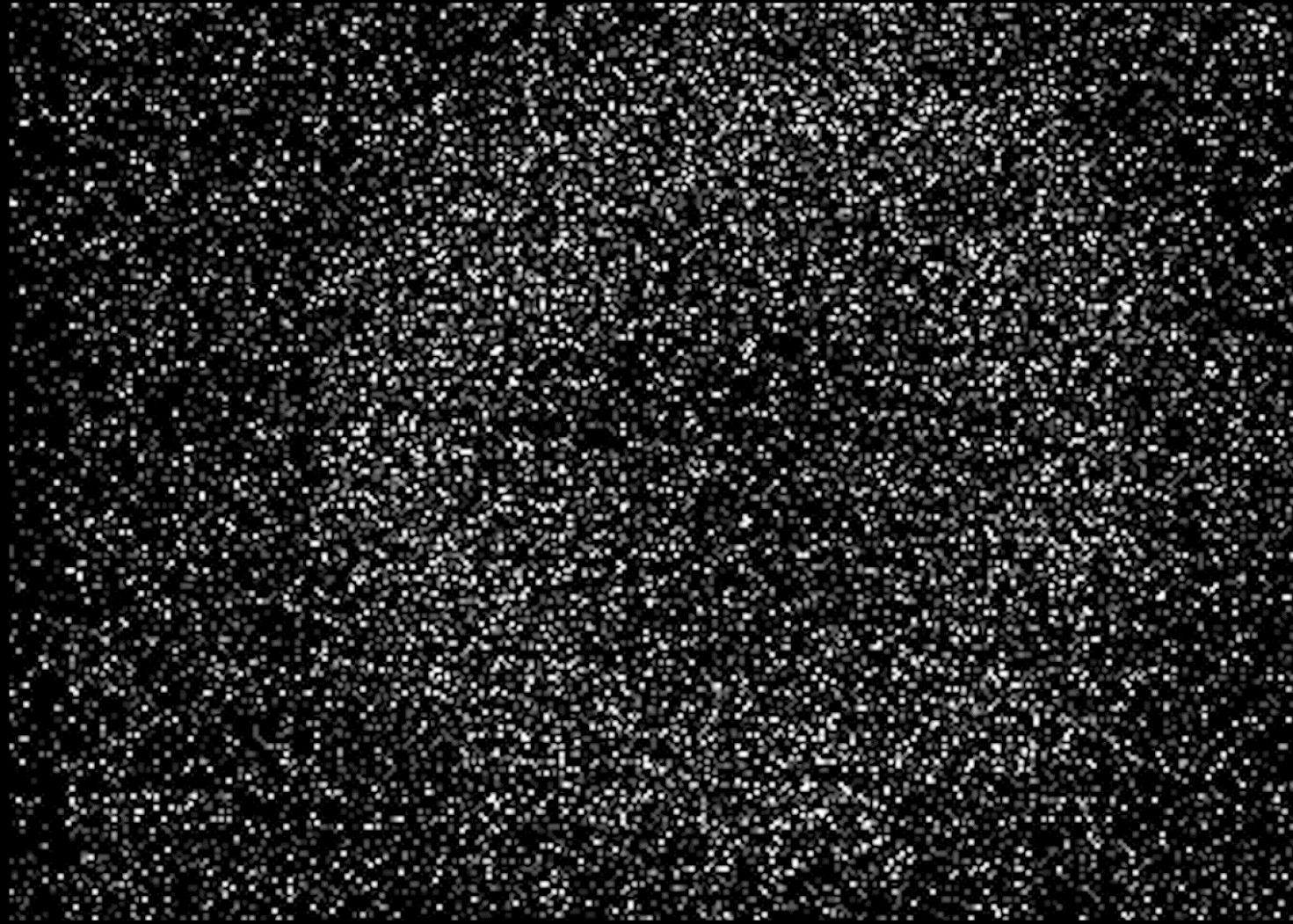




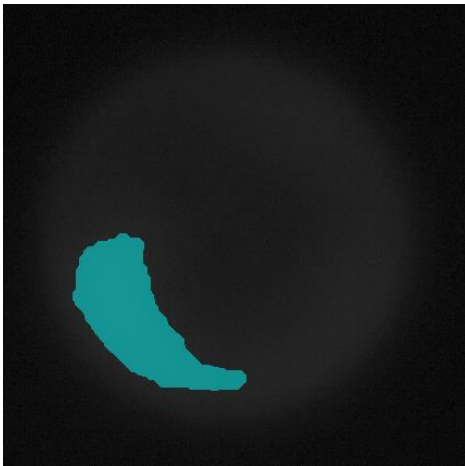
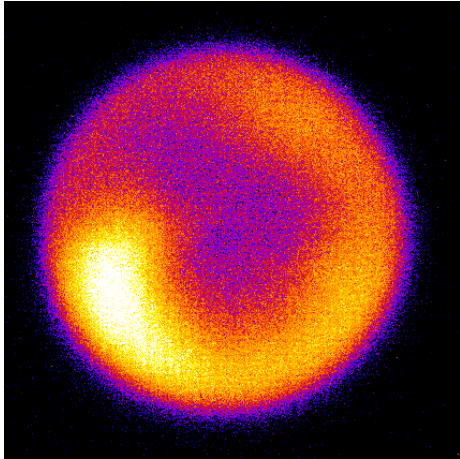


- ~ 10 km/s
- $\pm \mathbf{E} \times \mathbf{B}$ direction
- 5 times Bohm
diffusion



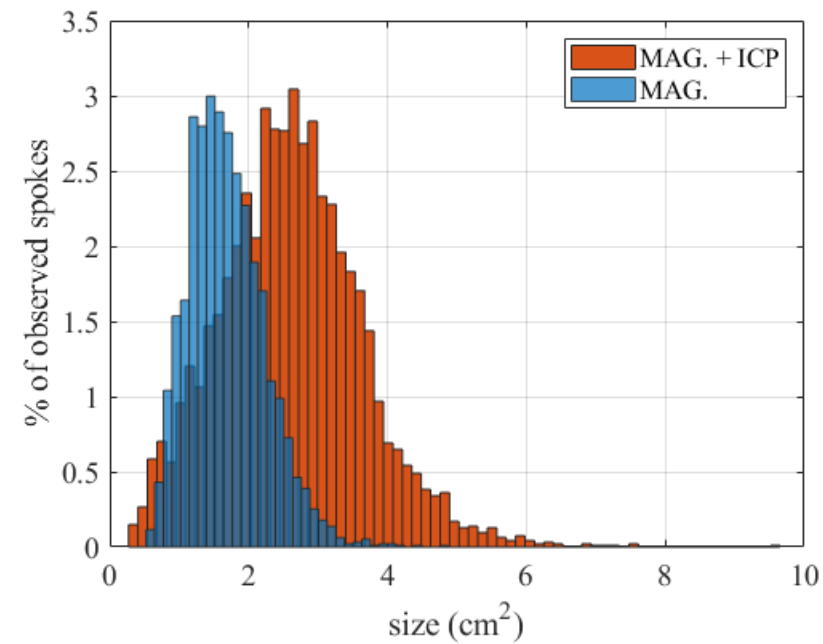
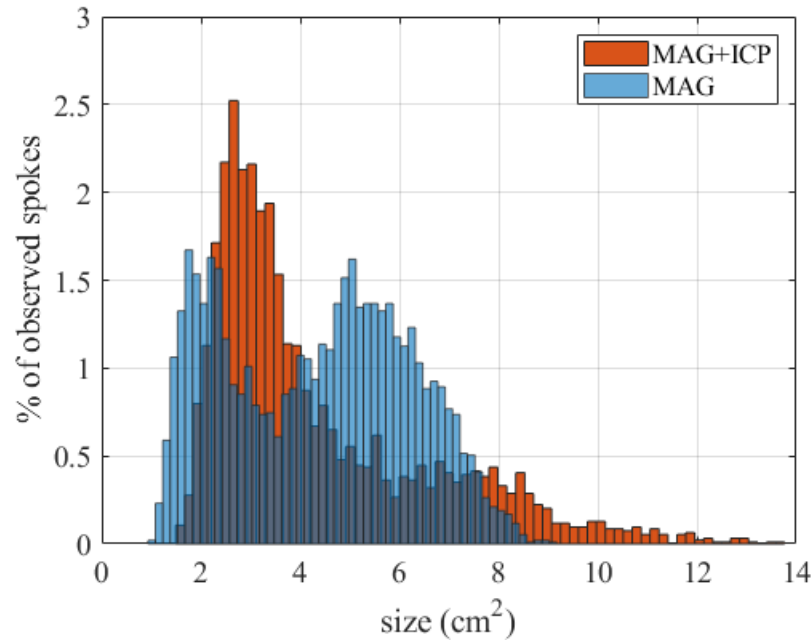


High speed camera characterization



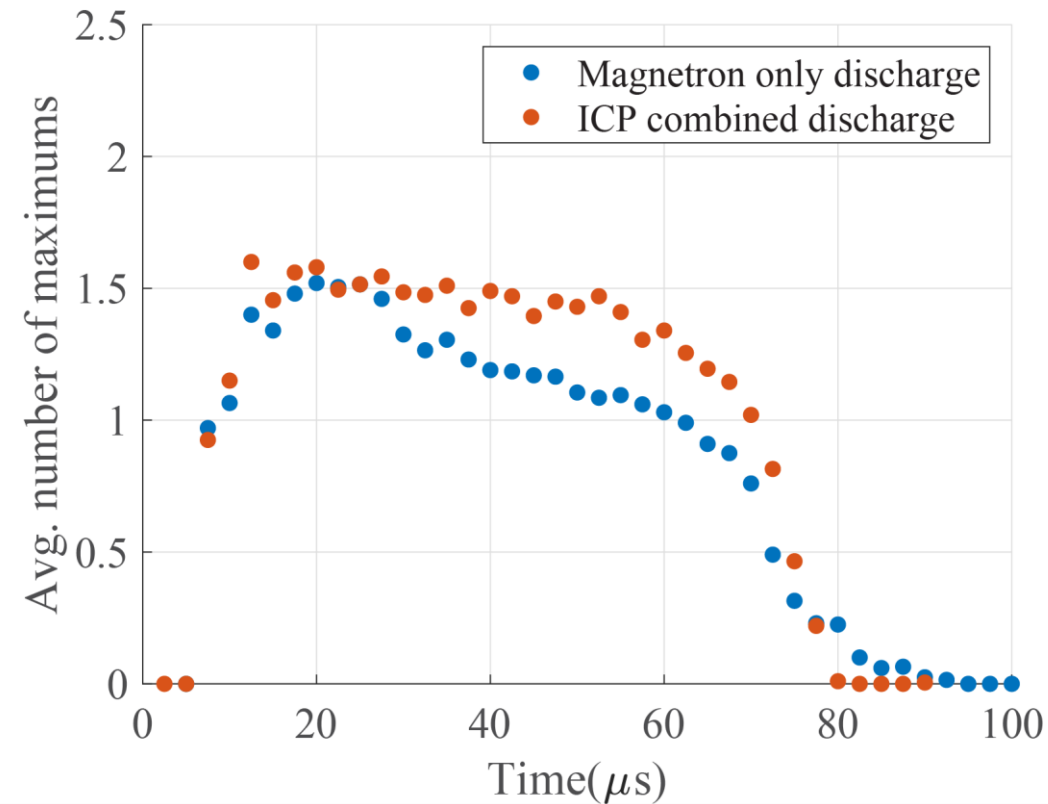
- Record 1 frame per pulse over many pulses.
- Construct statistical picture of spokes.
- Identify spoke mode number, size and intensity.
- Less diffuse spokes were observed at higher power discharges due to gas rarefaction.
- Gas rarefaction causes more variation in the size distribution of mode two spokes.
- Average spoke mode number follows the discharge power up to a certain threshold, past which it becomes stable around 1.5.

High speed camera characterization



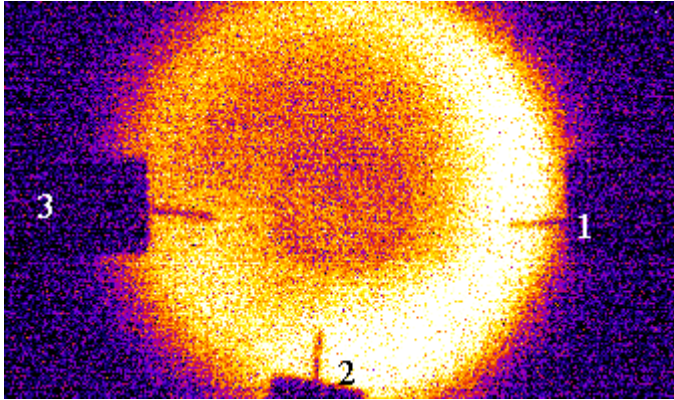
Size distribution

High speed camera characterization



Average mode number

Floating robe measurements



- Records floating potential caused by spokes.
- Synchronized with camera.
- We observed a rotation speed of $\sim 13\text{km/s}$.
- Decreasing plasma potential caused by increased secondary electron production at the leading edge of the spoke.

