ECR Discharge in Solenoidal Magnetic Field as a Source of Dense Wide-Aperture Plasma Fluxes

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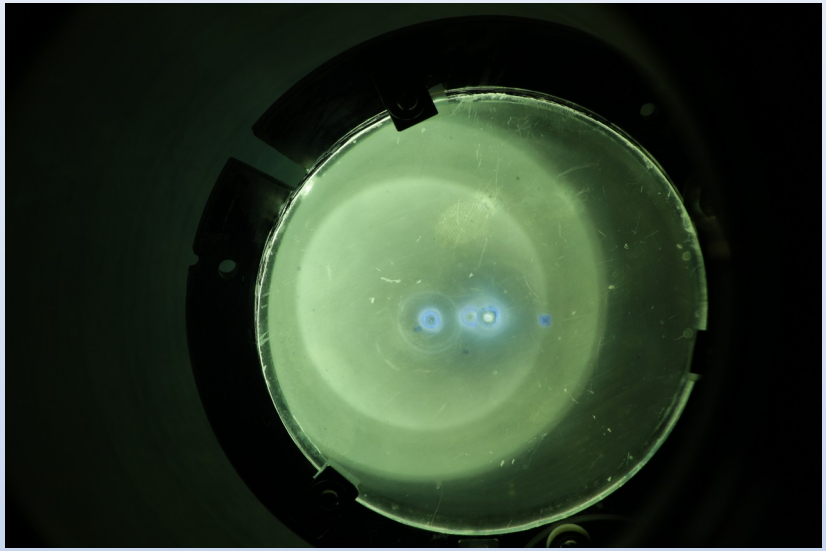

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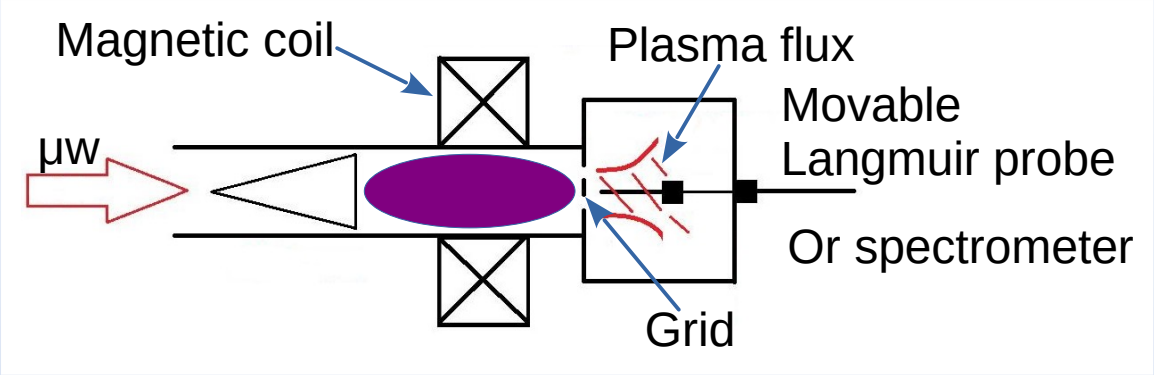
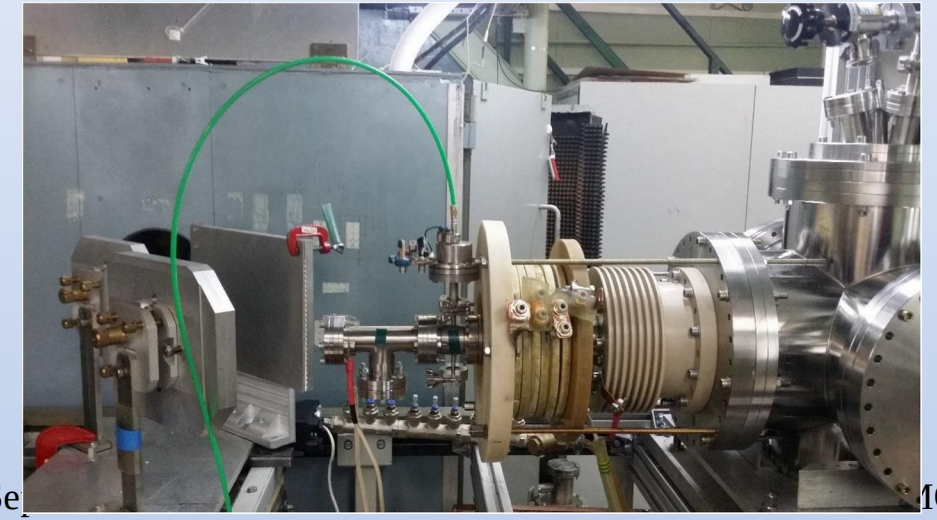
Motivation

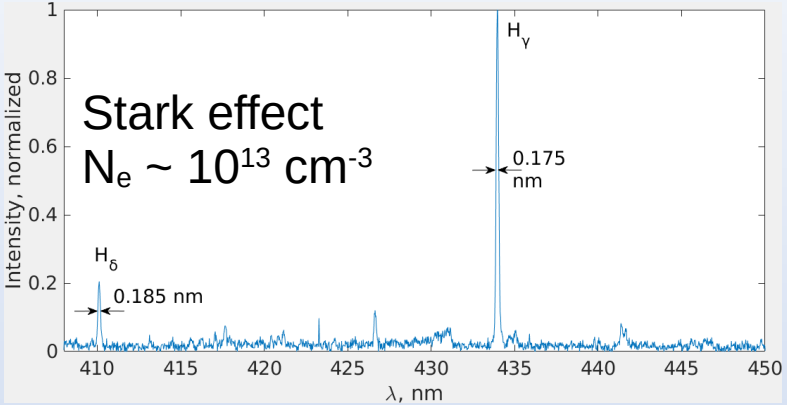
- Gasdynamic ECR discharge, sustained by powerful gyrotron radiation, has proven to be efficient source of high-current ion fluxes
- Is it possible to exploit the benefits of such a discharge for wide aperture proton beams formation for neutral injectors?
- Is it possible to sustain a cut-off-density plasma without magnetic longitudinal confinement?

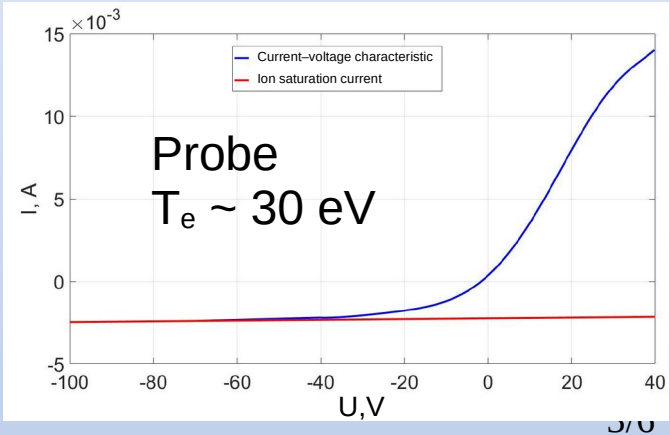
SMIS37-based experiment





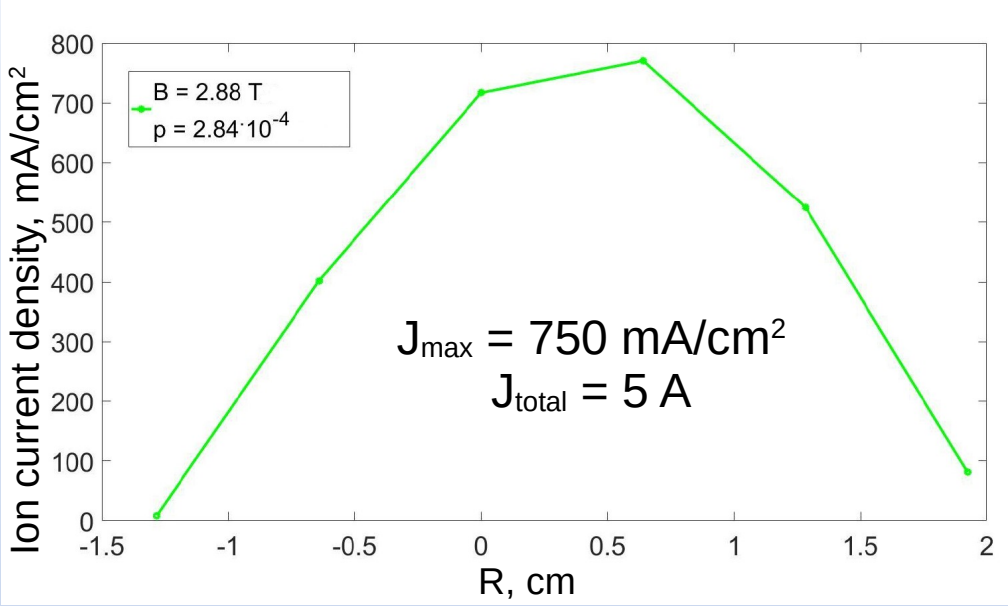
Plasma parameters



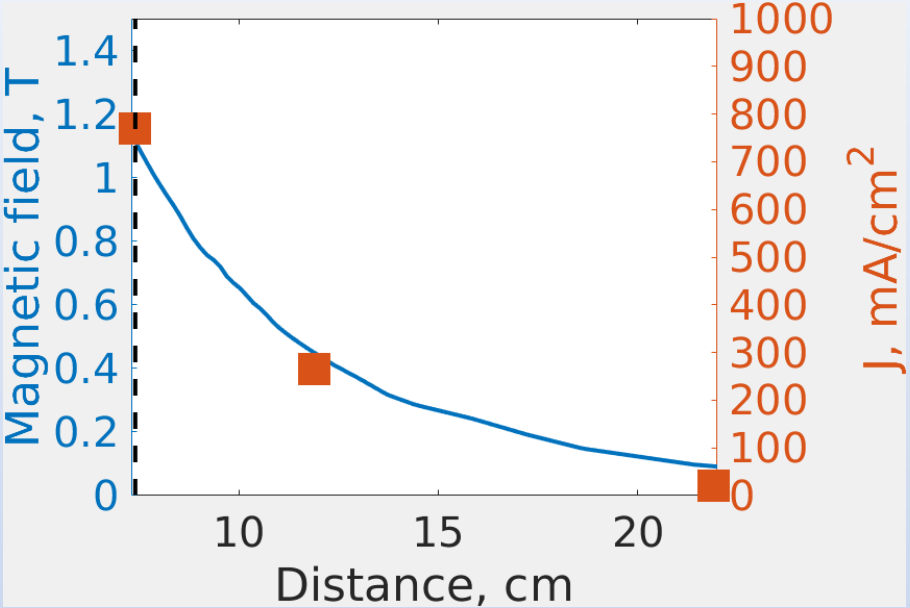


Plasma flux distribution

Transverse

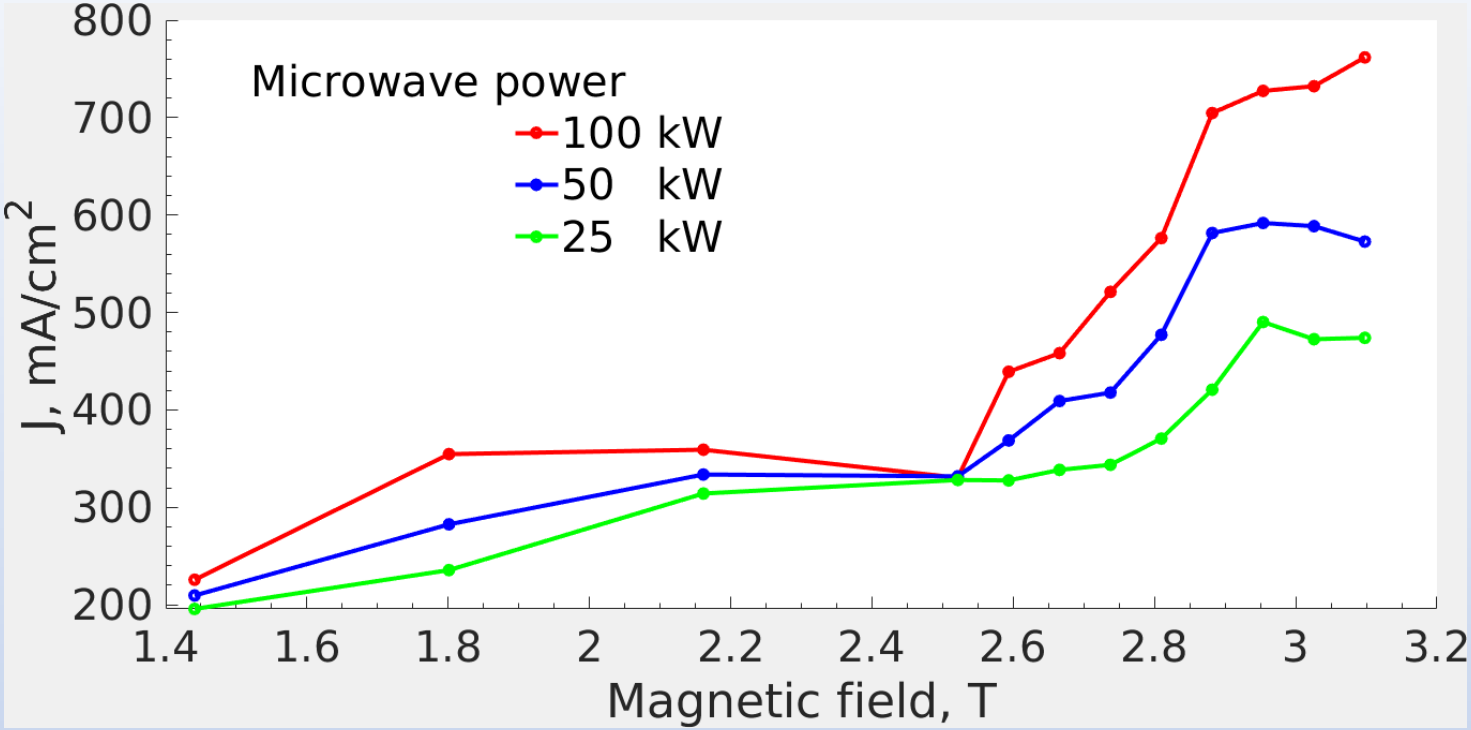


Longitudinal



Plasma flux follows the magnetic field lines

J as a function of power and B-field



Conclusion

- Cutt-off density can be reached without trap, if the power is enough
- Electron temperature ~30 eV can be reached, enough for high ionization rate
- Plasma emissivity ~ 750 A/cm^2

Next

- Bigger plasma chamber
- Gas feed optimization to reach over-dense mode
- High-current extraction system capable of several Amps (pulsed) at > 50 kV

Thank you for your attention!