

T_e and n_e Measurements in Edge Turbulence Plasmas by Helium Spectroscopy

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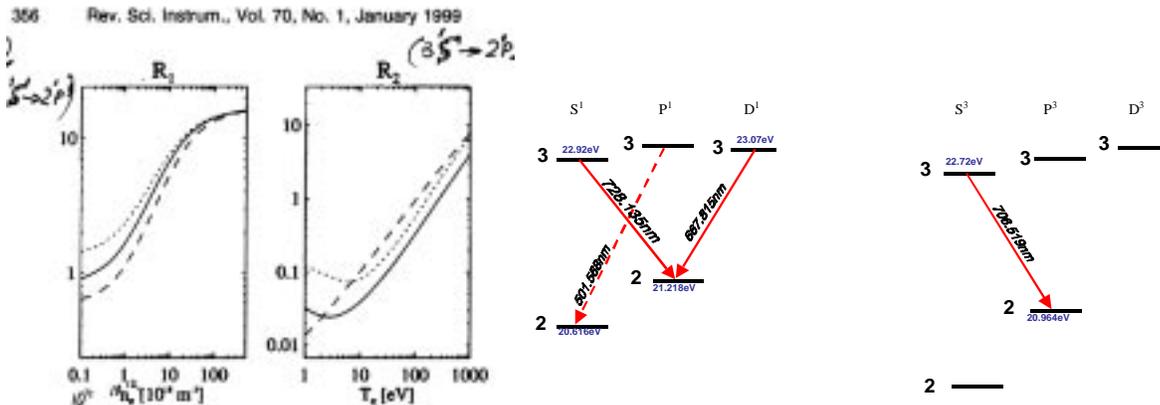
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Goal and Technique

Measure turbulent electron temperature fluctuations in a cm-scale region within the GPI tangential view on a 10 μ sec timescale.

Do this by measuring the line ratios of HeI emission which are sensitive to electron temperature and density



- n_e is obtained from the singlet-singlet line pairs
 $R_1 = 667.8\text{nm} / 728.1\text{nm}$
- T_e is obtained from the singlet-triplet line pairs
 $R_2 = 728.1\text{nm} / 706.5\text{nm}$

Plan for this Experimental Run

- Evaluate the brightness of these lines in the GPI imaging system using various interference filters (we presently use the He I line at 586.7 nm)

Quick reference data on demanded filter set

Filter set	3S ¹ -2P ¹	728.1nm*
	3D ³ -2P ³	706.5nm*
	3D ¹ -2P ¹	667.8nm*
(reference line)	3P ¹ -2S ¹	501.6nm*
(background)		720nm

* all filters should be ordered taking into account wavelength shift over 4 Deg inclination

- Evaluate the brightness of these lines spectroscopically (if possible) using He puffing (but may not be same ratio as in GPI puff)
- Develop proposal for US-Russian Bilateral Collaboration in this area
- Design hardware to test this diagnostic based on the existing GPI hardware, e.g. improved optics for greater signal strength, filter spectrometer and detectors, etc