

DEGAS 2 Modeling of Gas Puff Imaging Experiments

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2006 NSTX Results Review

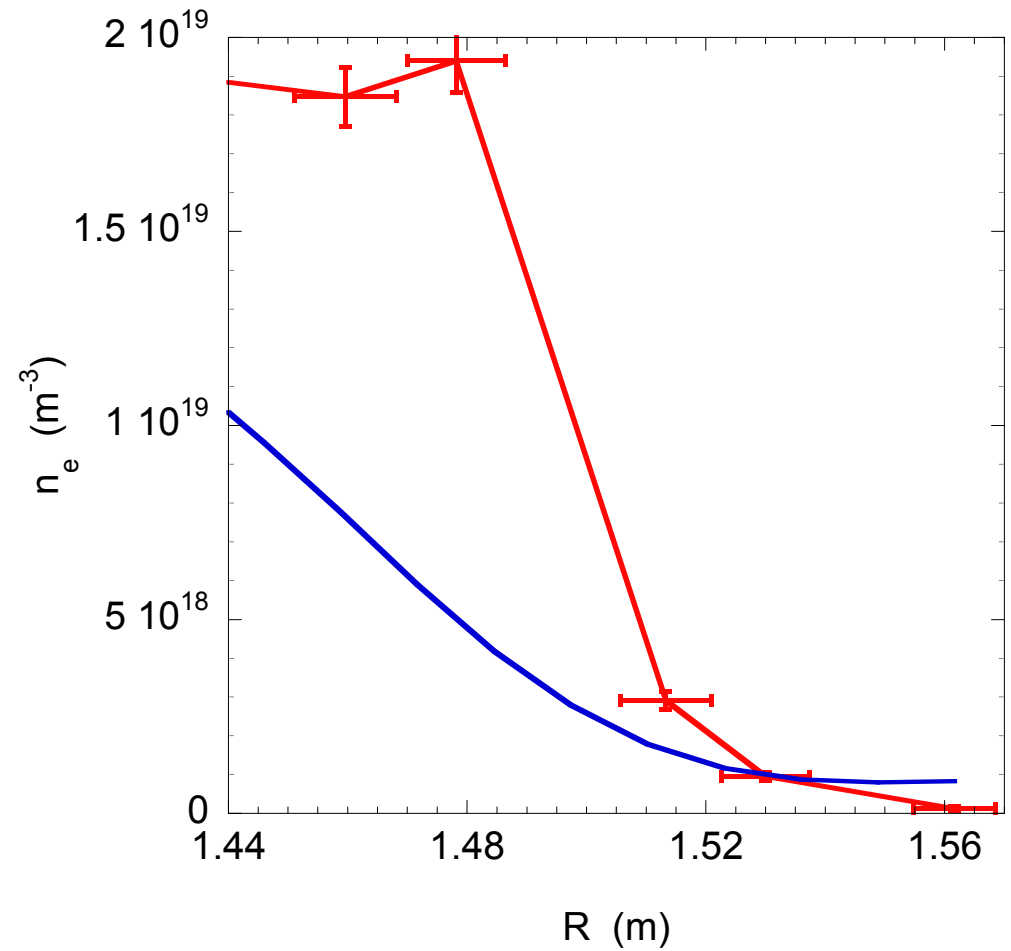
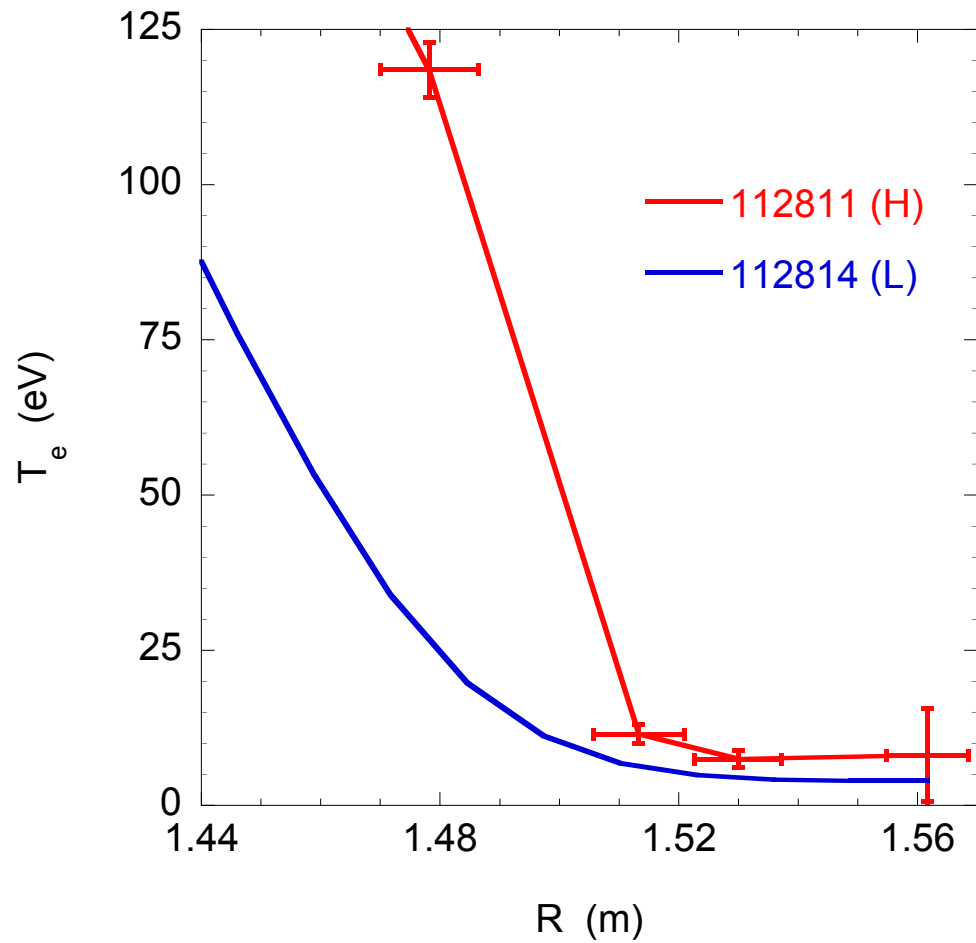
July 26–27, 2006



Three-Dimensional DEGAS 2 Simulations of GPI Experiments

- Procedure similar to [Stotler 2004],
- Begin with EFIT equilibrium at time of interest \Rightarrow mesh,
- Incorporate geometry of vacuum vessel, including manifold,
 - Point sources along a line matching actual manifold.
- Single-time $n_e(R_{\text{mid}})$, $T_e(R_{\text{mid}})$ from Thomson scattering,
 - Assume $n_i = n_e(\psi)$, $T_i = T_e(\psi)$ only.
 - Simulations are time-independent.
- Emulate 64×64 pixel camera view,
 - Record helium 587.6 nm emission.

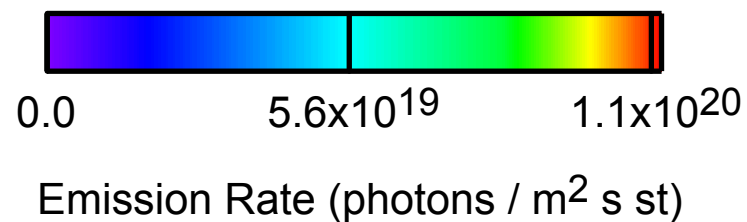
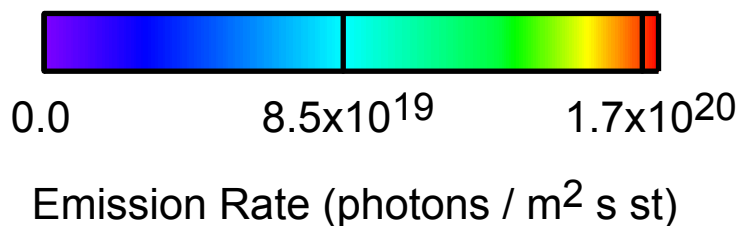
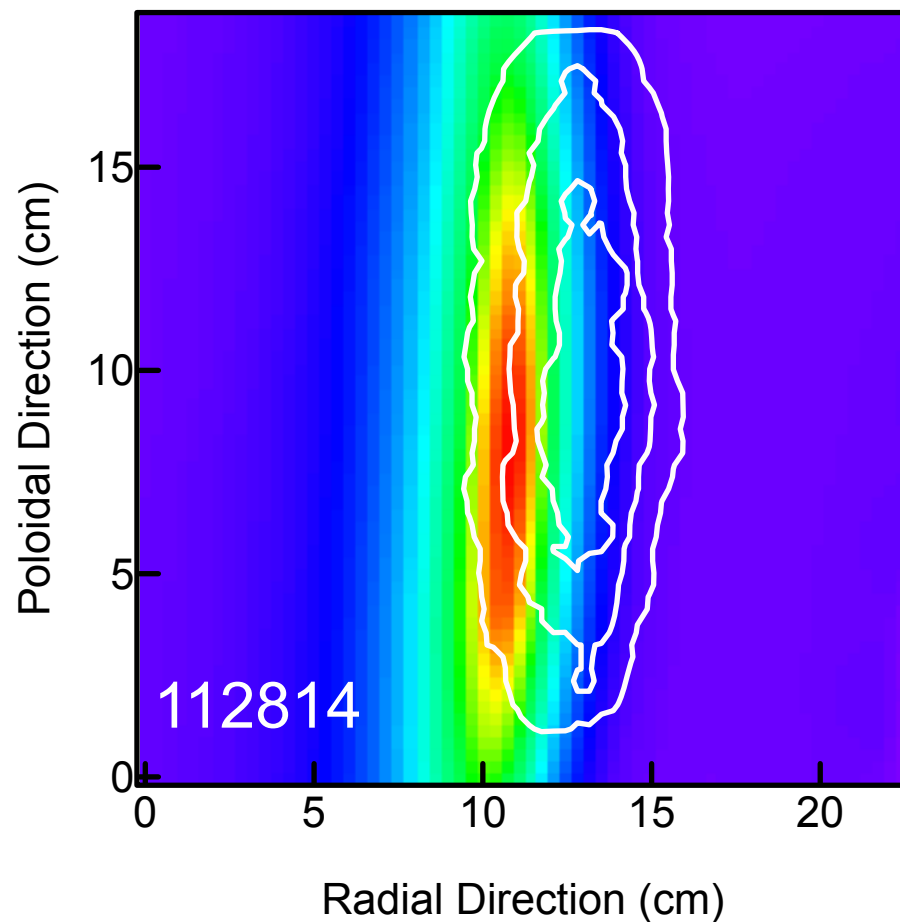
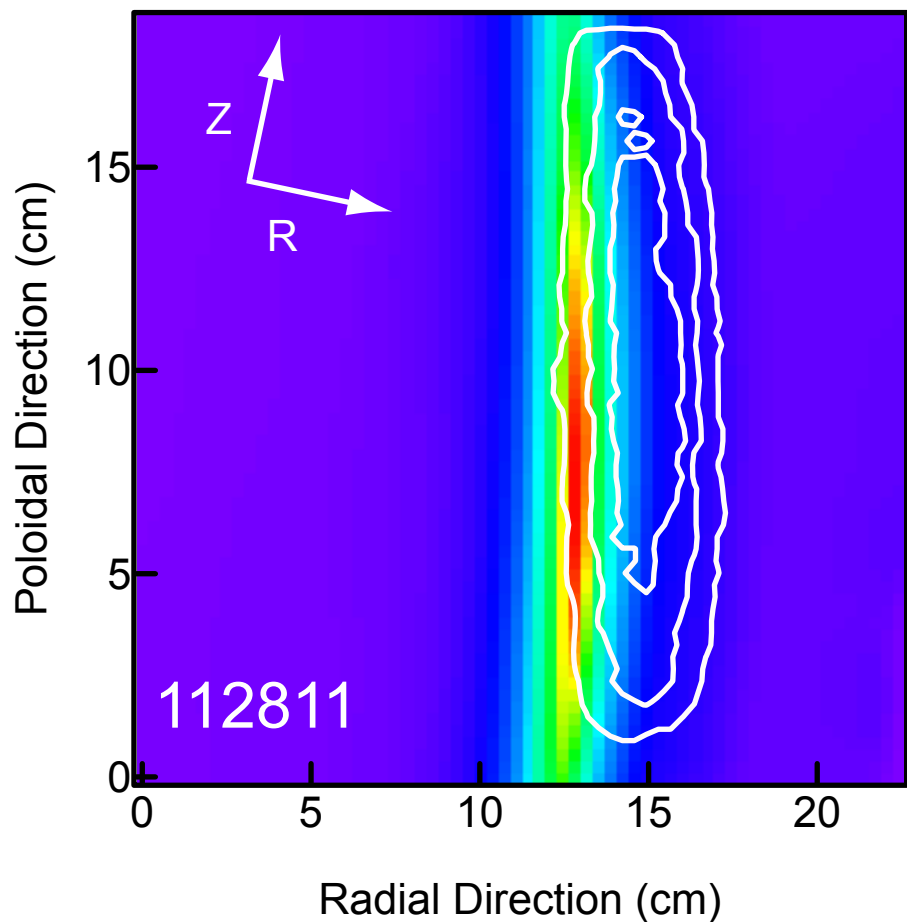
Thomson Scattering Midplane Profiles



Compare With Experiment

- Two shots: 112811 (H-mode), 112814 (L-mode),
- Overlay experimental data,
 - 3-D plasma used in DEGAS 2 *does not* correspond to a particular GPI frame,
 - \Rightarrow compare with “averaged” frame,
 - Use median in time to minimize effect of blobs.
- Experimental contours at 25%, 50%, and 75% of peak.

Radial Width & Location of Simulated Emission Clouds Match Experiment to Within Estimated Error



Conclusions

- Atomic physics gives simple relation between emission S & plasma parameters: $S = n_0 F(n_e, T_e)$,
 - \Rightarrow can unfold 2-D, time-varying plasma parameters from GPI images if we know n_0 ,
- 3-D DEGAS 2 simulations give this n_0 ,
 - Satisfactory agreement with observed emission clouds confirms fidelity of n_0 .