



## Proposal Submission for NSTX Research Forum 2001

Title	Visualization of Edge Turbulence with Laser-Induced Fluorescence
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Choose only one topical session by inserting X (Please use separate forms for individual proposals)	<b><u>2001 Research Program</u></b> ( <a href="mailto:esynakowski@pppl.gov">esynakowski@pppl.gov</a> ) <input type="checkbox"/> ET1: Macroscopic Stability <input type="checkbox"/> ET2: Transport & Turbulence <input type="checkbox"/> ET3: High Harmonic Fast Wave & Electron Bernstein Wave <input type="checkbox"/> ET4: Coaxial Helicity Injection <input type="checkbox"/> ET5: Boundary Physics <b><u>2002-2005 Research Opportunities</u></b> ( <a href="mailto:mpeng@pppl.gov">mpeng@pppl.gov</a> ) <input type="checkbox"/> TG1: Noninductive Startup <input type="checkbox"/> TG2: Heating, Current Drive & Fueling <input type="checkbox"/> TG3: Macroscopic Stability <input type="checkbox"/> TG4: Transport & Turbulence <input type="checkbox"/> TG5: Energetic Particle Physics <input type="checkbox"/> TG6: Multiphase Interface <input type="checkbox"/> TG7: General Plasma Science Research <b><u>Fluctuations Measurement</u></b> ( <a href="mailto:esynakowski@pppl.gov">esynakowski@pppl.gov</a> ) <input checked="" type="checkbox"/> X Fluctuations Measurement proposals

**Select a presentation option by inserting X:**

- X Oral presentation in person
- Remote presentation via ShowStation and speakerphone
- Ask discussion leader to include in discussion
- No need to present, but include in meeting summaries
- Attend Forum only

**Special Requests for your proposal (projector type, time constraints, etc.):**

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**Please write a one-page description of your presentation:**

In the fields of fluid mechanics and combustion research, a critical tool for investigating fluid flows and turbulence has been Planar Laser-Induced Fluorescence (PLIF). This technique utilizes a laser sheet beam to excite a resonant atomic or molecular transition and subsequently image the fluorescence, usually at a different wavelength, onto a high resolution 2-D detector to visualize the density or flow structure. Depending on the laser bandwidth and absorption linewidth, the technique can be used to measure the density or velocity of a gas or ion species. This technique has the advantage of good temporal and spatial resolution along with a good signal-to-noise ratio. It is intrinsically non-invasive and thus does not suffer the problem associated with physical probes inserted into the medium. Laser-induced fluorescence (LIF) has been applied to a number of problems, however it has not previously been used for high resolution 2-D imaging in a plasma. We have developed a planar laser-induced fluorescence (PLIF) imaging system to view the ion density with sufficient sensitivity to measure detailed structure and turbulence in the plasma. Results have been obtained with argon, krypton, and xenon ions. Fluctuations and structures in the plasma have been observed in the MNX helicon plasma. A rotating  $m=1, 2$  mode has been clearly observed. Recently results have been obtained from the CDX-U spherical torus using an argon gas puff and will be presented.

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Please e-mail questions or comments to the organizers listed above.