

## Proposal and Attendance Form for NSTX Research Forum 2001

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**Please write in the boxes below a one-page abstract of your proposal to be presented:**

**Title: Relation of transport and plasma electric potential**

**Abstract:**

Understanding the mechanisms which determines transport in fusion plasmas remains as a key issue in nuclear fusion research. It is now recognised that the control of radial electric fields has opened a new era in fusion confinement. The key element of present research proposal - comparative studies of the radial structure of electric field (plasma electric potential) and plasma confinement in NSTX - has the following objectives:

First, to investigate the influence of radial electric fields in the confinement properties of fusion plasmas. In particular, to determine the role of radial electric field in low collisionality plasmas, where trapped particles effect is the important part of our understanding of the transport in fusion plasmas. In addition, to study the mechanisms which control the interplay between the core and edge plasma region, and to study influence of magnetic shear and critical gradients on transport.

Second, to study the structure of the equilibrium plasma potential and its fluctuations and transport near the operational (density and beta) limits in fusion plasmas. The viability of a fusion reactor requires to reach a significant betas that requires a careful control of plasma profiles or transport and magnetic configurations.

Third, to investigate the influence of electric field to the process of improvement of plasma confinement. This issue is a key element for the viability of a fusion reactor, it is directly linked with the radial structure of electric fields. The first direct measurements of plasma potential during the transition to improved confinement made in JFT-2M and T-10 tokamaks found the coupling between the changes in potential and confinement. The causality between them is an open question.

A Heavy Ion Beam Probe (HIBP) is a proposed diagnostic, which can provide a number of unique measurements in NSTX: plasma electric potential, density, poloidal magnetic field and their fluctuation. The preliminary design of HIBP for NSTX

was already done in RPI. Here we propose to make the detailed calculations and participate in preparation, installation and probing experiments jointly with RPI team. Choose only one topical session by inserting X for each proposal ([Use separate forms for separate proposals](#)) **2000 Results** ([mbell@pppl.gov](mailto:mbell@pppl.gov)) & **2001 Research**

**Program** ([esynakowski@pppl.gov](mailto:esynakowski@pppl.gov)) (Please submit by January 10, 2001)

\_ET1: Macroscopic Stability \_ET2: Transport & Turbulence \_ET3: High Harmonic Fast Wave & Electron Bernstein Wave \_ET4: Coaxial Helicity Injection \_ET5:

Boundary Physics **2002-2005 Research Opportunities** ([mpeng@pppl.gov](mailto:mpeng@pppl.gov)) (Please submit by January 11, 2001) \_TG1: Noninductive Startup \_TG2: Heating, Current Drive & Fueling

\_TG3: Macroscopic Sta \_TG4: Transport & Turbulence \_TG5: Energetic Particle Physics \_TG6: Multiphase

Interface (Boundary Physics) **Fluctuations Measurement** ([esynakowski@pppl.gov](mailto:esynakowski@pppl.gov)) (Please submit by January 10, 2001) \_Fluctuations Measurement proposals

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No need to present, but include in meeting summaries

Attend Forum only (in person or with remote access)

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

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