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NSTX 5 Year Plan – MHD Diagnostic Ideas

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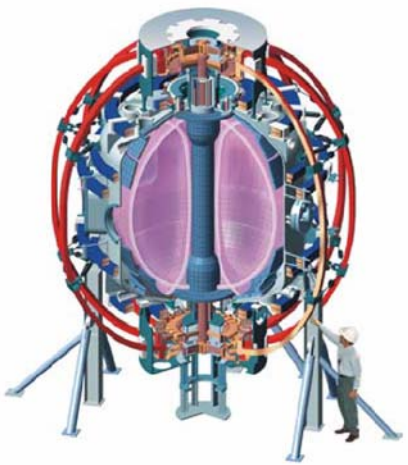
NSTX 5 Year Plan Meeting - Diagnostics
February 27th, 2007
PPPL



Initial ideas for MHD Diagnostics – 5 Year Plan meetings (I)

- RWM / kink control / stabilization physics
  - Present discrimination of n = 1 – 3 will continue to be important; avoid losing n = 3 discrimination by bad sensor - redundant B_p coils
  - Possible need for expanded sensor set for control optimization, or if passive plate configuration modified
  - Expand present USXR system to have two toroidal positions for all three fans; need adequate coverage of plasma outboard edge region
  - Toroidal array of reflectometers in edge region to measure small mode displacements
  - Radial interferometer array - density perturbations during global MHD
  - Fast SXR camera – more specific views desired (divertor, edge)
- NTM characterization, mitigation, stabilization
  - Reflectometers to measure island width, expand present accessible density range
  - NTM stabilization thought to be lower priority than other research. Would need some form of diagnostic to locate mode for active stabilization

Initial ideas for MHD Diagnostics – 5 Year Plan meetings (II)

- Plasma rotation active control / rotation damping physics
  - Higher time resolution (5ms, 2ms?) for more detailed $V_\phi(\psi)$ evolution
  - Real-time CHERS to allow feedback on rotation for active control
- Fast ion and current redistribution by MHD
  - Fast ion D_α diagnostic, should be available routinely for all shots
- Equilibrium / stability research (NHTX, et al. - shape, stabilizers)
  - Enhanced edge pressure resolution (Thomson, CHERS)
  - Enhanced edge current resolution (MSE)
- Measurement / control of scrape-off layer current (SOLC)
  - See talk by H. Takahashi for full details
  - Measurement of currents in passive stabilizer plates (also useful for RWM research)
  - Expanded Langmuir probe coverage
- Expanded disruption studies
  - Detailed measurement of SOLC planned above would be used in such studies