



U.S. DEPARTMENT OF  
**ENERGY**

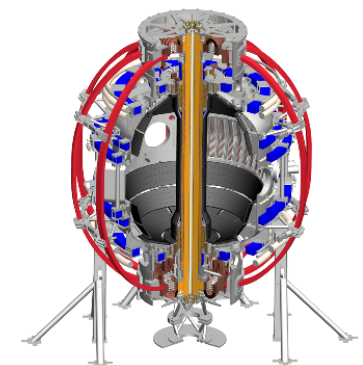
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# ERD upgrade & $D_\alpha$ NB monitor

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NSTX-U diagnostic planning for FY16-FY18  
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# Upgrade of ERD diagnostic (FY17)

- Edge Rotation Diagnostic (ERD)
  - 2x7 fibers from toroidal, poloidal views
  - Measure “passive” C III and He II lines at the plasma edge
  - Provides temperatures (par/perp), velocity,  $E_r$ ; complements CHERS
- ERD would benefit from enhanced spatial and temporal resolution (toroidal views)
  - Increase sampling rate: under way (see R. Bell’s presentation)
- Proposal: add fiber holder at Bay L (aka “CHERS bkg” port)
  - Add full set of 210/400 $\mu$ m fibers covering (outboard) mid-plane
  - Spatial resolution: 50-100 radial views, <1 cm resolution
  - Measurements in the range  $135 \text{ cm} < R < 155 \text{ cm}$  for ERD
  - Measurements in the range  $100 \text{ cm} < R < 155 \text{ cm}$  for HAL
  - Need fibers, fiber holders (Bay L port & ERD spectrometer)
  - Need new patch panel in DARM

# Install $D_\alpha$ monitor for NB ion species mix

- > Knowledge of NB ion species mix (full, 1/2, 1/3 energy) crucial for
  - Analysis of active charge-exchange spectroscopic data: CHERS, FIDA, ...
  - Predictions of NB deposition (hence NB-driven current, torque, etc.)
  - Continuously monitor behavior of NB sources, incl. conditioning shots (support Ops)
- > Values of species mix presently used (e.g. TRANSP) are old, incomplete
  - Last update: TFTR 1994
  - Species mix characterized for  $E_{inj}=80-120$  keV; data at lower energies missing

## Proposal: install monitor for NB species for both NB lines (FY17)

- Monitor D-alpha range at output of ion sources & neutralizers
- Have detectors (CCD camera)
- Need fibers, spectrometer

