

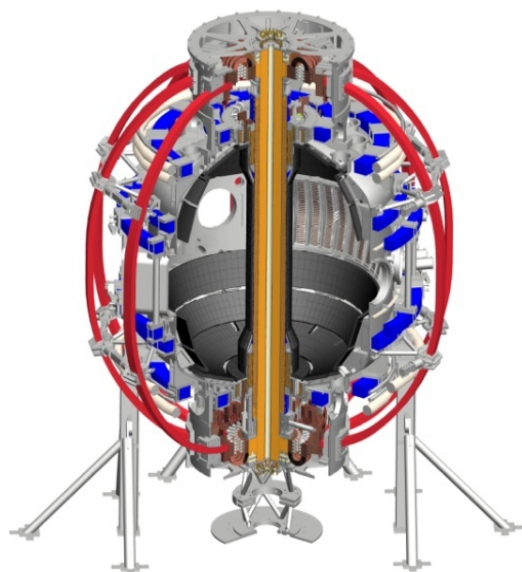
Waves & Energetic Particles contributions to FY2015 JRT

*Coll of Wm & Mary
Columbia U
CompX
General Atomics
FIU
INL
Johns Hopkins U
LANL
LLNL
Lodestar
MIT
Lehigh U
Nova Photonics
Old Dominion
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U Washington
U Wisconsin
X Science LLC*

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and the NSTX-U Research Team

**PPPL, room B238
12/06/2013**



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York U
Chubu U
Fukui U
Hiroshima U
Hyogo U
Kyoto U
Kyushu U
Kyushu Tokai U
NIFS
Niigata U
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Inst for Nucl Res,
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TRINITY
Chonbuk Natl U
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ASIPP
CIEMAT
FOM Inst DIFFER
ENEA, Frascati
CEA, Cadarache
IPP, Jülich
IPP, Garching
ASCR, Czech Rep*

WEP contributions target characterization of [new] *actuators*, model validation

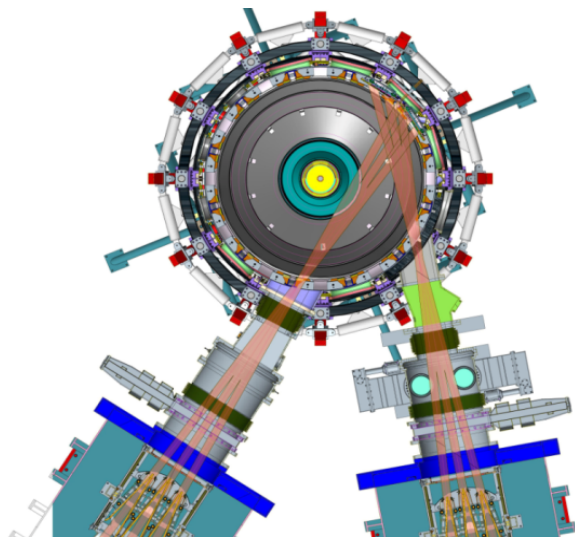
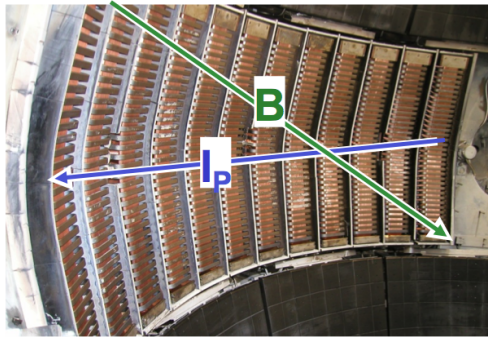
This research will *examine a variety of heating and current drive techniques*

in order to validate theoretical models of both the actuator performance

and the transport and global stability response to varied heating and current drive deposition.

NSTX-U can contribute with studies of NBI and NBI+HHFW/MHFW experiments

This research will *examine a variety of heating and current drive techniques...*



Present NBI

New 2nd NBI

- Actuators are complementary to NBI+ECH on DIII-D
- Restrict to flat-top phase
- Characterization of 2nd NBI line part of FY15 Research Milestone R15-2
 - Specific targets for JRT: effects of NBI parameters on q profile, rotation, *AE stability
- NBI+rf scenario of interest for ITER
 - Unique (US) capability for NSTX-U
 - Look at effects on J_{NI} (through heating \rightarrow bootstrap)
 - Will ITER-relevant MHFW conditions be achievable in FY15?

Model development and validation is high priority for FY13–15; excellent progress made

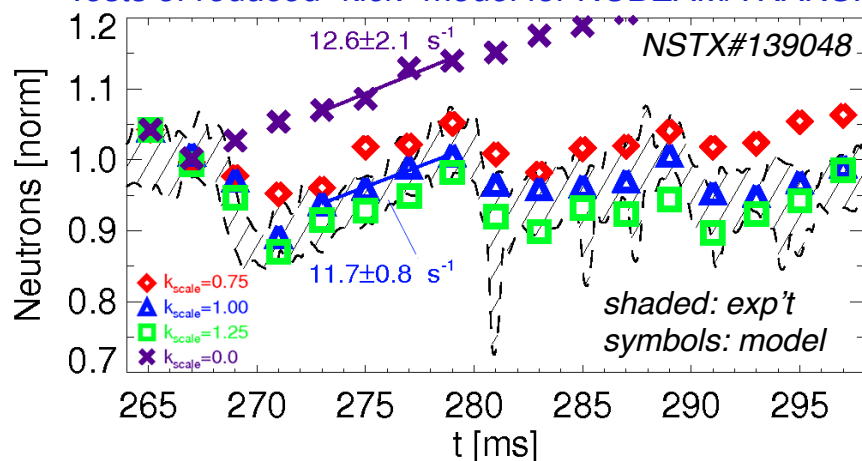
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- > Complementary to NBI+ECH on DIII-D
- > Characterize new NBI line (R15-2)
- > Study NBI+rf scenarios

- Validation of *classical* NUBEAM/TRANSP foreseen (R15-2) as “baseline capability”
- New capabilities in NUBEAM/TRANSP will enable more accurate simulations

Tests of reduced “kick” model for NUBEAM/TRANSP



- ← - “Kick” model for NUBEAM being developed
- Improved computation of fast ion-related quantities (e.g. J_{NB} , torque) when instabilities are present

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- > Characterize new NBI line (R15-2)
- > Study NBI+rf scenarios
- > Validation of NUBEAM/TRANSP
- > Validation of reduced models
- > Improved HHFW/MHFW modeling capabilities
- Reduced models for fast ion transport by *AEs [, kinks, NTMs] being developed/validated (R14-2)
 - Critical Gradient (1.5D-QL) model
 - “Kick” model for NUBEAM
- Improved models also being developed for HHFW/MHFW
 - Awaiting for new data for extensive validation
 - Will apply to NBI+rf scenarios
- *Modeling work exploits synergy with DIII-D and collaborators*

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- > Characterize new NBI line
- > Study NBI+rf scenarios

- > Validation of NUBEAM/TRANSP
- > Validation of reduced models
- > Improved HHFW/MHFW modeling capabilities

- > Apply reduced models for fast ion transport
- > Apply improved models for NBI + HHFW/MHFW