

NSTX Team Meeting - Physics Analysis

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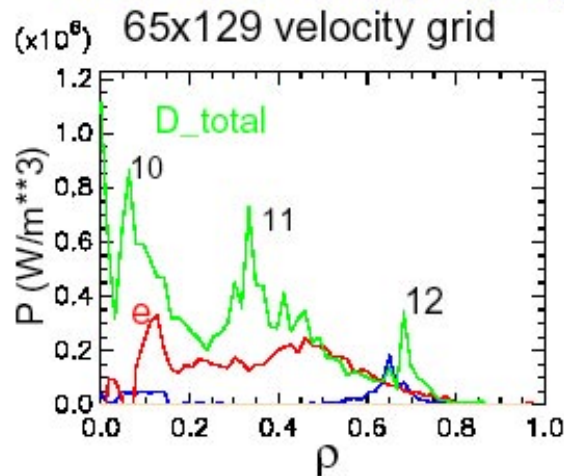
HHFW Heating and CD Modeling

- **TRANSP & CURRAY Package :**
 - Algorithm for power absorption has been modified to improve code reliability (Mau)
 - Ray marching algorithm upgraded to avoid “crash” problems found occasionally with NSTX and DIII-D simulations
 - New library of CURRAY routines, including upgrades to some I/o packages has been delivered to PPPL
- **HHFW code development:**
 - Development of non-Maxwellian species for plasma dielectric response in TORIC is continuing (SciDAC-related work)
 - AORSA code can now accept fast ion distributions from CQL3D (SciDAC)
 - (see NSTX test case next vg)
 - Renewal proposal to SciDAC, which indirectly supports some NSTX analysis, has been submitted to DOE

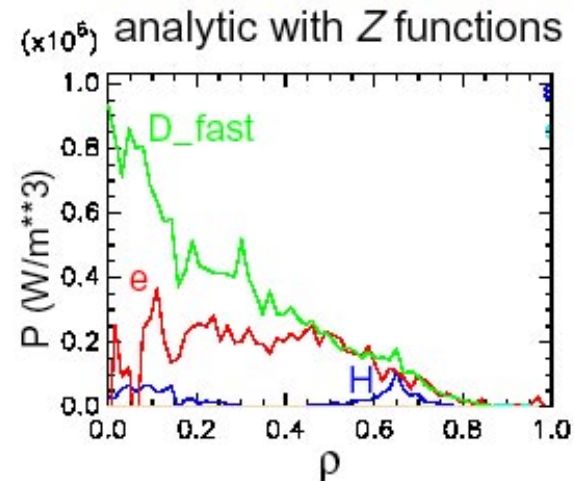
Power absorbed by fast deuterium ions is more localized than with the equivalent bi-Maxwellian

D+, neutral beam injection only (NBI) plasma in NSTX shot 108251,
(A. Rosenberg, invited, 2003 RF meeting).

Non Maxwellian (CQL3D)



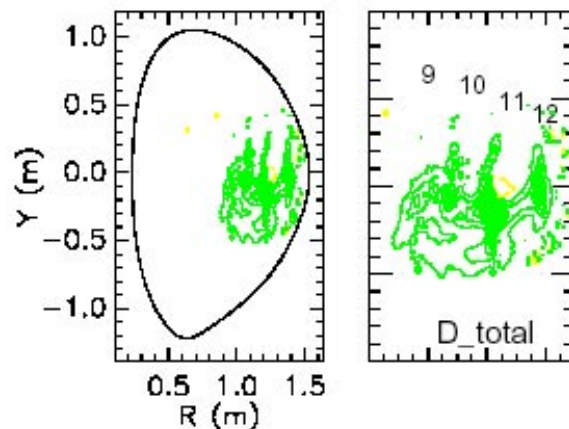
Bi-Maxwellian (17.1 keV)



$P(D) = 59\%$

$P(e) = 34\%$

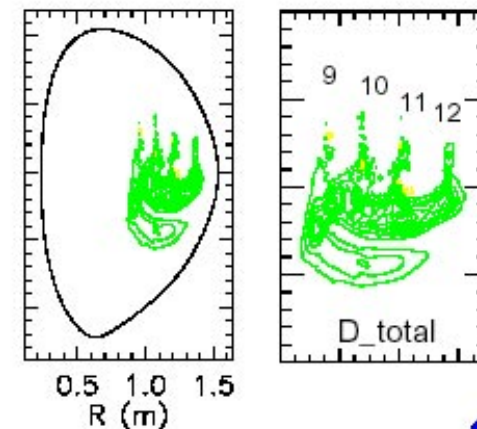
$P(H) = 7\%$



$P(D) = 63\%$

$P(e) = 30\%$

$P(H) = 7\%$



Transport Studies

- **GS2 analysis (Redi)**

- Because of the poloidal extent of the converged microtearing mode eigenfunction, linear GS2 simulations were required to determine extended domains for adequate nonlinear calculations
 - Very large storage requirements appear necessary for nonlinear calculations of the tearing mode transport.
 - An acceptable size for the poloidal range is as high as seventeen 2π cells, rather than the usual one 2π cell used in ITG nonlinear simulations.
- Discussions on non-linear calculations with W. Dorland are continuing

MHD and Equilibrium Studies

- **EFIT-related development (Sabbagh)**
 - time evolution data for midplane field components from EFIT data on the MDS+ tree being provided for use in MSE calibration.
 - significant compute time specification upgrades made to PHOENIX, including the ability to specify <1 ms compute times for NSTX EFIT
 - code can now set compute times based on arbitrary signals (e.g., plasma current)
 - time resolution now automatically optimized for between-shot runs
 - new reconstruction being developed with great structure detail, implementing new magnetic diagnostics from Menard
 - Green table built from this work will support rtEFIT.