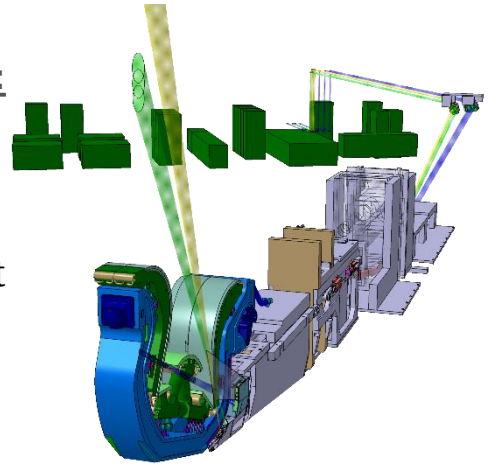
E.E. Mukhin et al

IAEA-FIP/1-5

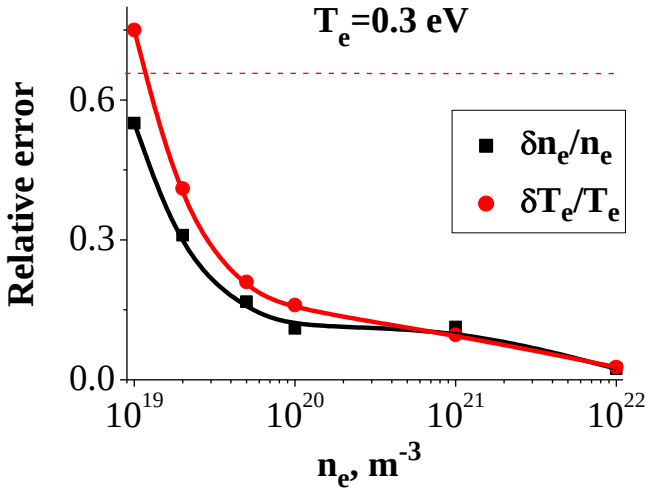
INTEGRATION OF THOMSON SCATTERING AND LASER-INDUCED FLUORESCENCE IN ITER DIVERTOR *Engineering and Performance Analysis*

Over past two years:

Integration of
DTS & LIF
in ITER divertor port



Measurement requirement T_e=0.3 ± 0.2 eV (numerical experiment):



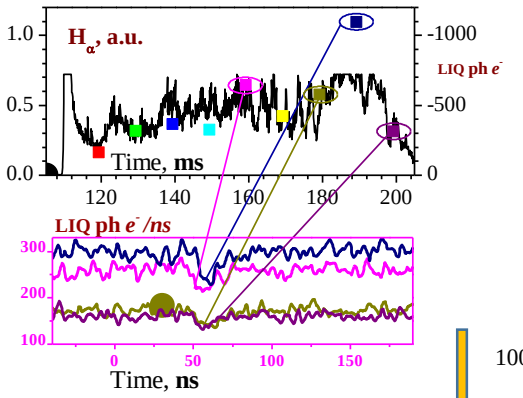
The dashed line marks the acceptable accuracy.

Next step challenge: Spatial distribution of ITER Divertor plasma $T_e\ n_e\ n_i\ T_i\ n_{He}\ n_{H/D/T}$ via **combined TS/LIF as a routine** diagnostics to estimate:

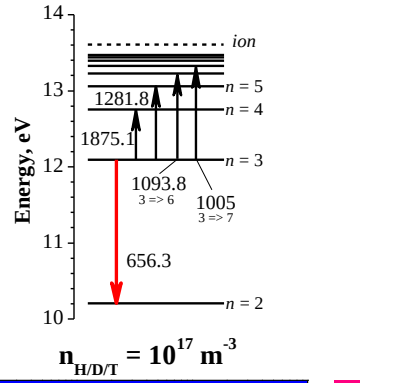
- Rates of ionization and recombination (T_e, $n_e\ n_i\ n_{H/D/T}$);
- Emission intensity ($T_e\ n_e\ n_i\ n_{He}\ n_{H/D/T}$);
- Friction force of the plasma flow due to collisions with neutrals ($T_i\ n_i\ n_{He}\ n_{H/D/T}$);
- Pressure of the incoming plasma flow ($T_e\ n_e\ T_i\ n_i$).

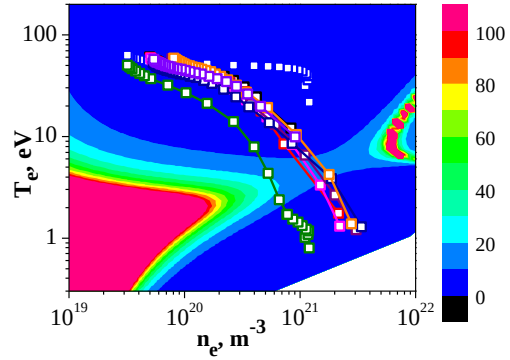
Over past year: LIF for measurement of $n_{H/D/T}$ **Laser-Induced Quenching** (LIQ)

Globus-M H_α LIQ

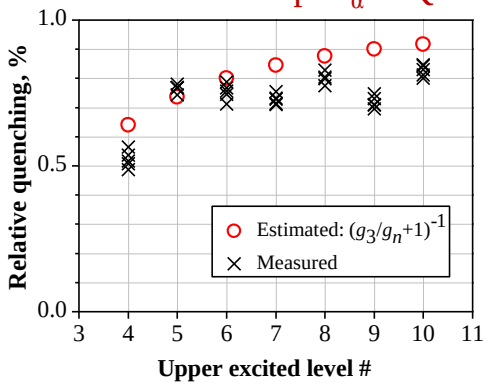


Pumping of n = 3 → 7 by OPO laser with
λ =1005 nm, Δλ =2000 pm,
τ =10 ns, E =2.2 mJ,
S=1.5 cm^2





Deuterium lamp D_α LIQ



Simulation for ITER divertor D_α LIQ

Colours represent relative errors (%)
Pumping of n = 3 → 5 by a laser with
λ =1281.8 nm, Δλ =2000 pm,
τ =10 ns, E =2.2 mJ, S=1.5 cm^2