

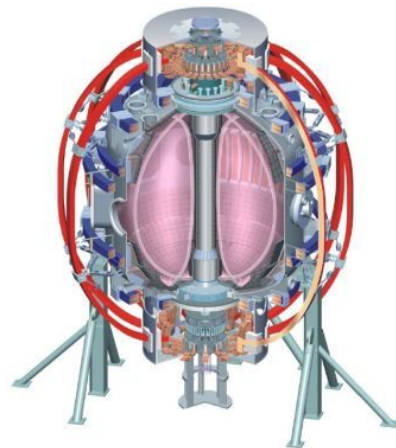
Combination of applied 3-D fields and snowflake divertor for impurity control

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Rajesh Maingi,



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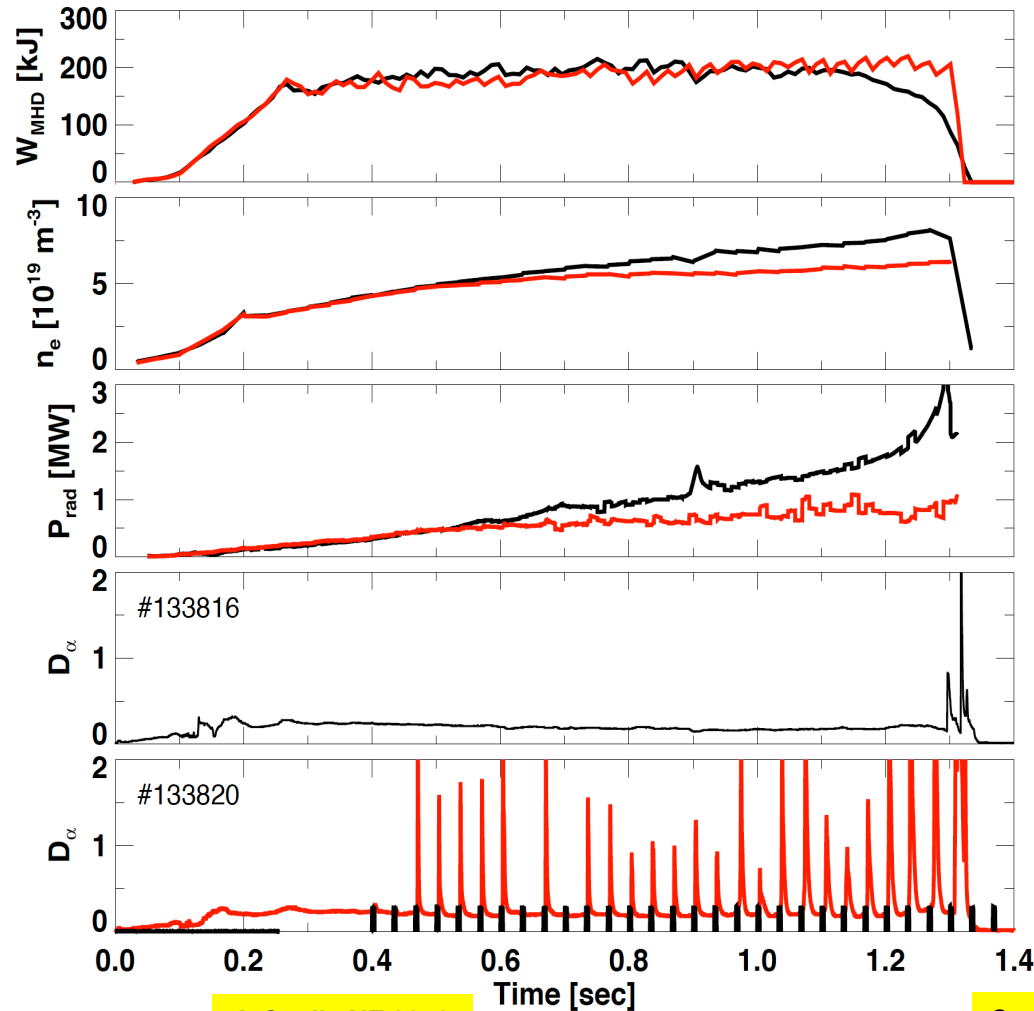
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Goals and Background

- Goal: combine externally applied 3-D fields with snowflake divertor
 - In particular, look for synergies between the two techniques to reduce impurities, including DC fields and square-wave to trigger ELMs
- Applied $n=3$ 3-D fields have changed the rotation profiles and edge stability, including triggering ELMs
- Applied 3-D fields have created striations on the divertor target, consistent with separatrix splitting
- There has been no clear signature of enhanced particle transport,
 - Edge impurities reduced when ELMs are triggered
- The snowflake configuration in FY10 was maintained for long pulses, which reduced the carbon content in the plasma
 - attributed to reduced physical sputtering because of easier access to partial detachment
- The idea here is to combine the two techniques, to look for possible synergies in impurity control

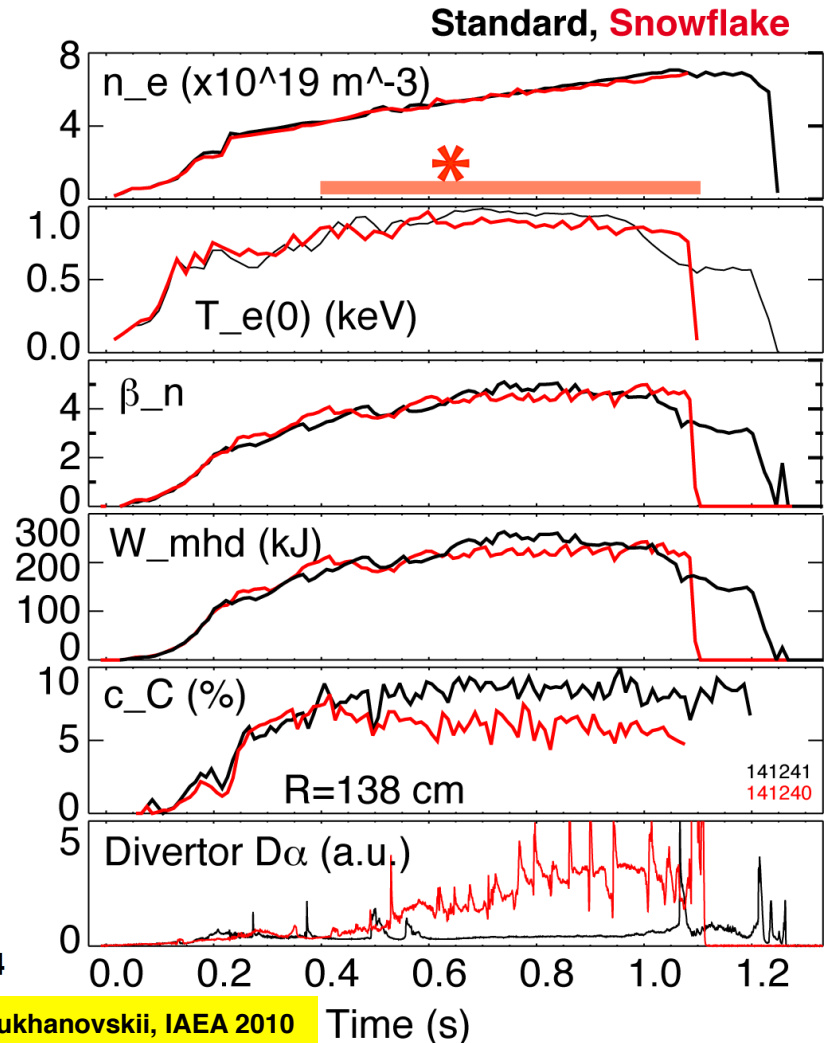
Triggered ELMs with $n=3$ fields and Snowflake divertor each succeeded in reducing edge impurities

Type I ELMs triggered for impurity control (post-lithium, $n=3$)



J. Canik, NF 2010

“Snowflake” divertor reduced impurities



Soukhanovskii, IAEA 2010

Experimental Plan (1/2 – 1 day)

- Reproduce best snowflake discharges
- Add DC 3D fields to look for evidence of density pumpout
 - Also look for striations in the divertor heat and particle fluxes
- Vary the field spectrum ($n=3$, $n=2$, and maybe $n=1$), to look for an enhancement of particle transport
- Use square wave pulses of DC fields to trigger ELMs and augment the natural ELMs in the snowflake
- Attempt experiments in as low of q_{95} as possible, where the 3D fields are predicted to have the biggest effect