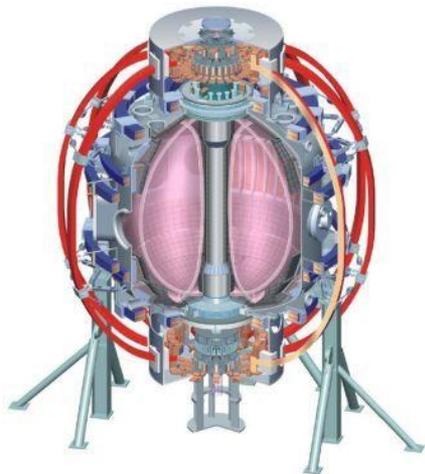


Density pump-out by 3-D field application in L-mode

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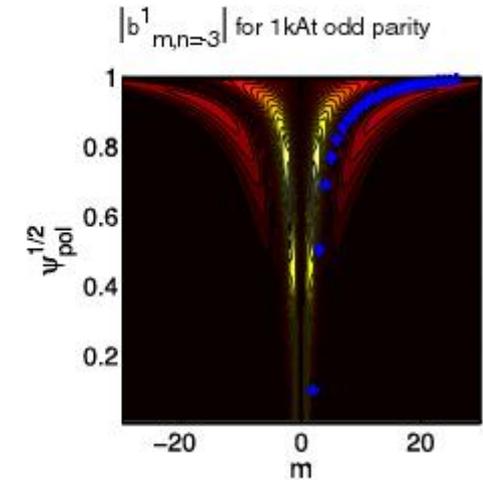
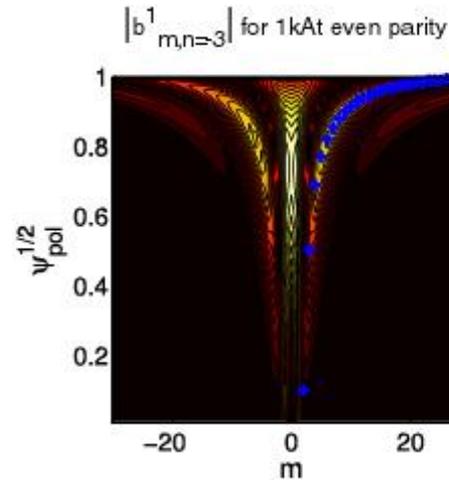
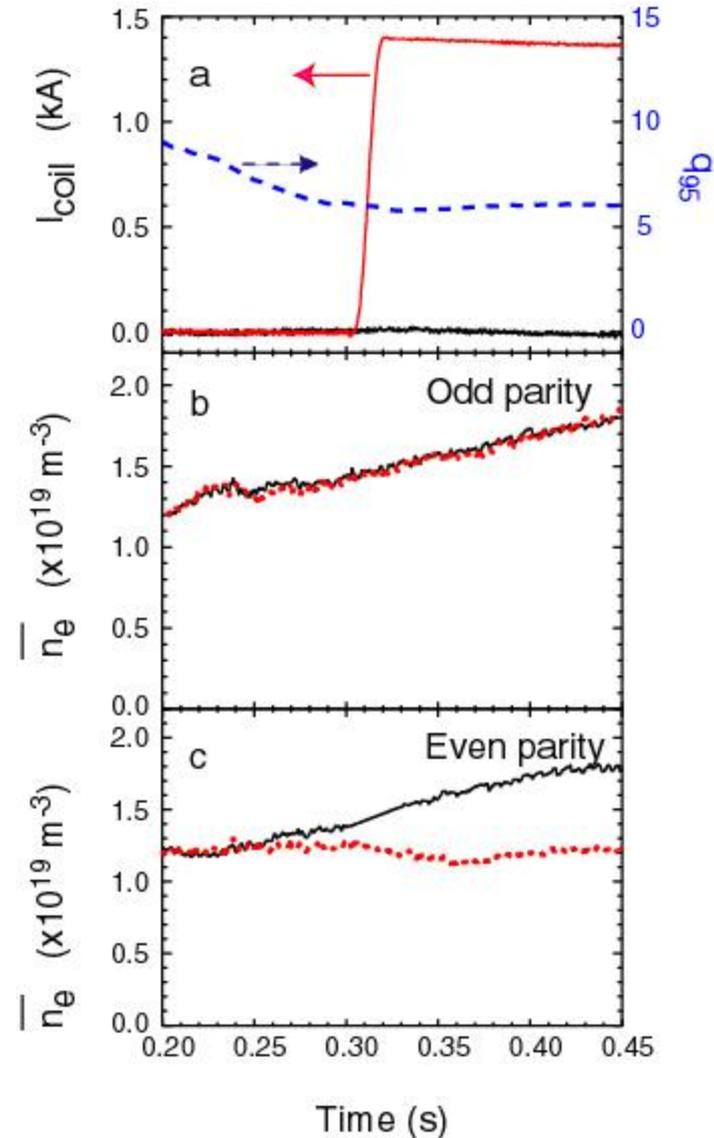
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Motivation

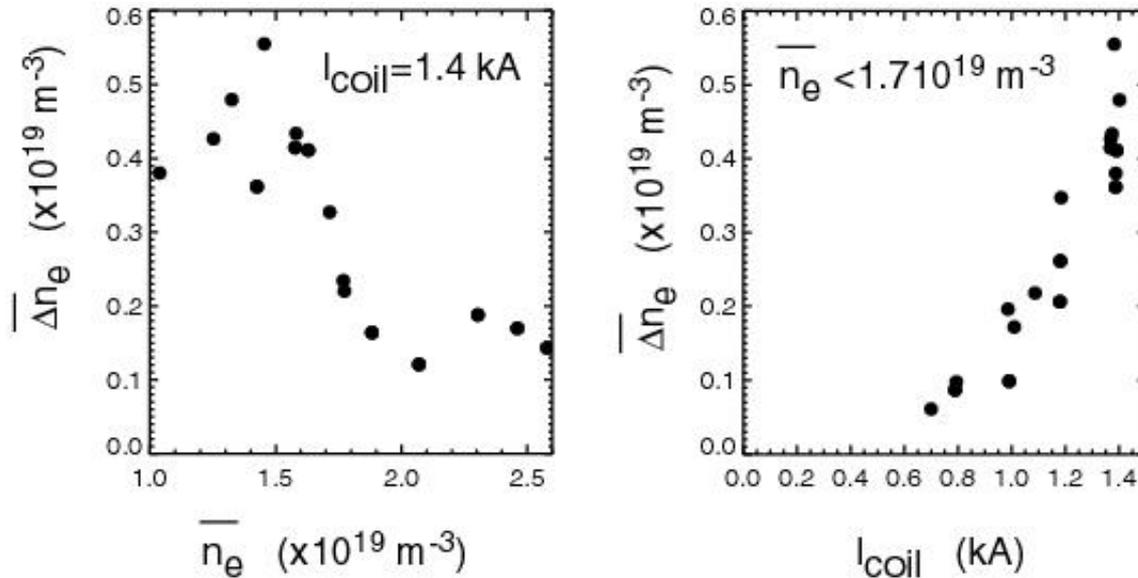
- Density pump-out is a prominent phenomenon accompanying many RMP ELM control experiments, eg for DIII-D and JET
- MAST observed density pump-out only in L-mode plasma
- All of these experiments had **good pitch angle alignment and low collisionality**
- NSTX H-mode didn't show density pump-out with 3-D field application but collisionality was high due to continuously rising density level → what about L-mode??
- **3-D field induced enhanced particle transport in L-mode might be observed with good pitch angle alignment and lower collisionality**

Density pump-out is only observed with good pitch angle alignment



- **MAST data** shows that good pitch angle alignment is important for density pump-out
- **In NSTX**, only mid-plane coils are available but low q_{95} plasma is expected to produce better alignment (J.-K. Park)

Density and coil current is also important for the size of pump-out



- The observed L-mode density pump-out in MAST is **more effective in lower density and with higher coil current**
- Change in E_r and edge turbulence also observed to increase with increasing coil current

Application of $n=3$ fields in low q_{95} and density

- Density pump-out might be observed also in NSTX if necessary conditions are met, ie low q_{95} and density
 - **High I_p L-mode** with minimal gas puffing will be investigated for 3-D field application
- Low power (~ 1 MW) NBI injection will be also explored **to vary toroidal rotation**
- Change in edge turbulence characteristics will be investigated if pump-out is induced, eg GPI, FReTIP, Reflectometer, etc

Experimental plan

- Development of high I_p (1.1-1.2MA) Ohmic L-mode shot (3 shots)
- Coil current scan: $n=3$ DC 3-D field ($I_{3-D}=500A, 1kA, \text{ and } 1.5kA$) (6 shots)
- Density scan for optimal coil current, beginning from the lowest density (5 shots)
- L-mode shots with 1MW NBI injection (5 shots)

Request 1 day of run time
(Minimum of 0.5 day)