

H-mode access and ELM mitigation with Supersonic Gas Jet



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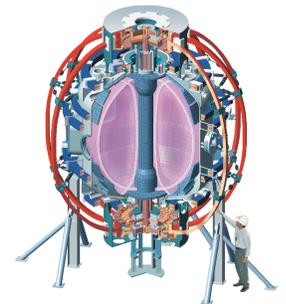
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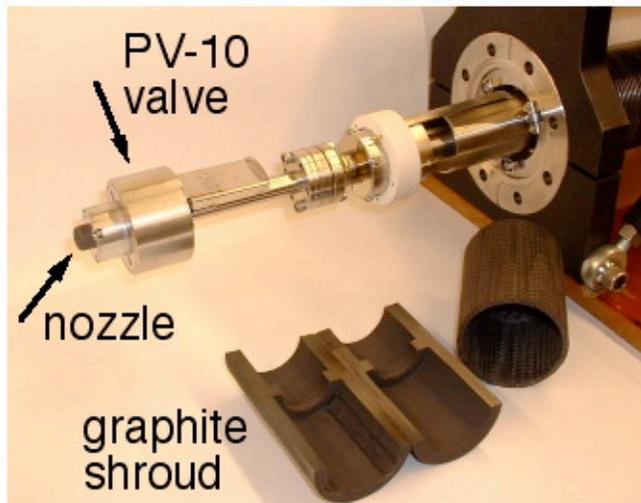
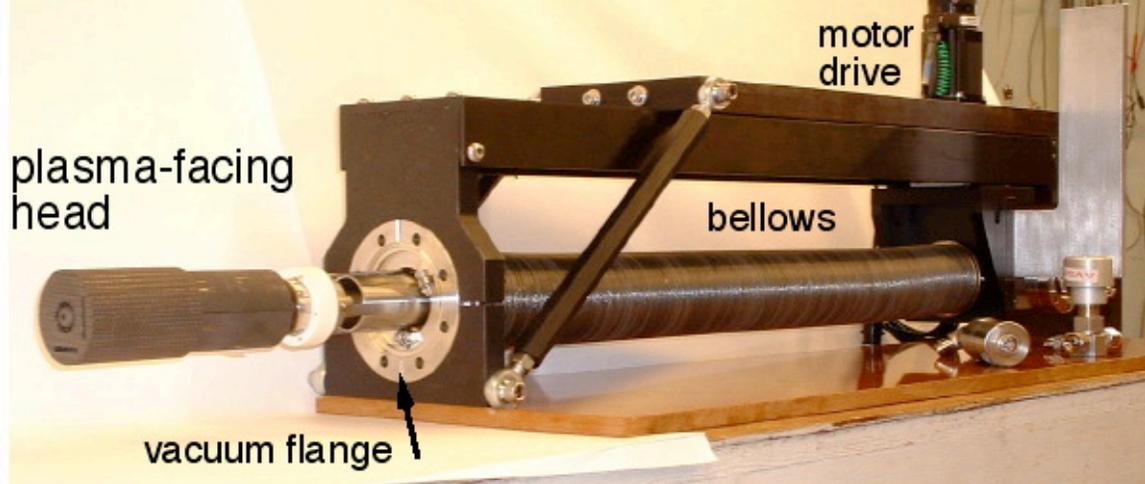


Results up to date

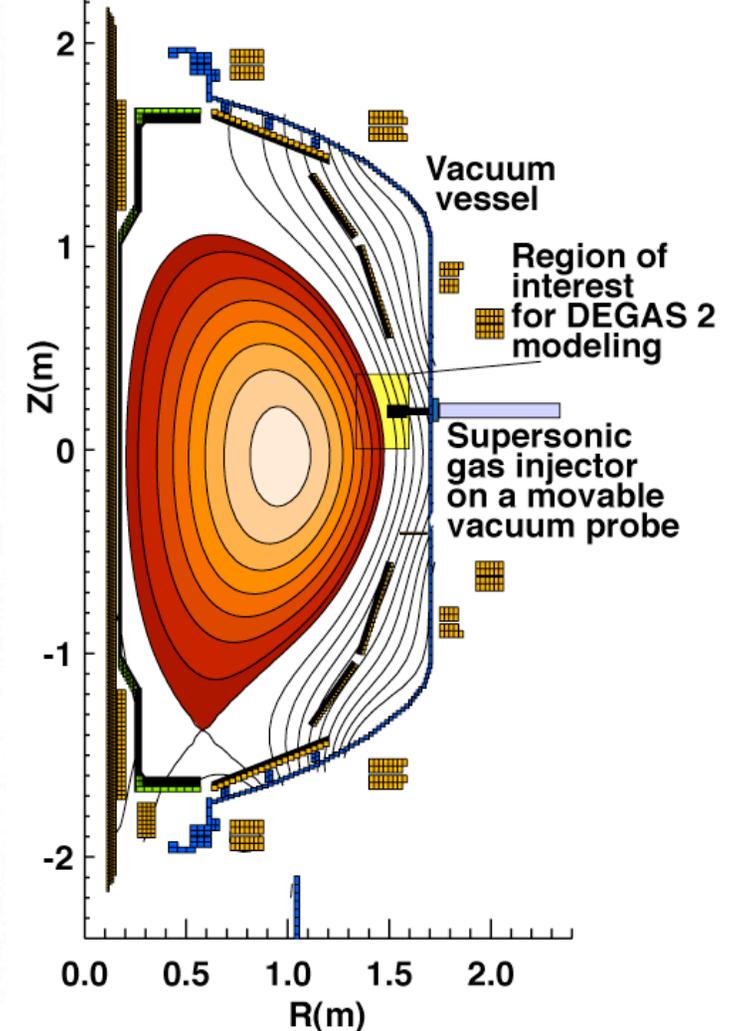
- XMP-35 “SGI commissioning” successfully completed
- **Preliminary results** are encouraging: higher fueling efficiency, high gas jet collimation (expect higher wall saturation limit), good SOL penetration, **compatibility with H-mode edge**
- Nozzle optimization in progress
- Independent high pressure gas delivery system is being considered

Supersonic gas injector has become operational in FY'04

Assembled SGI on movable vacuum probe



NSTX cross-section



SIG parameters

- Gas: D₂, He (being planned)
- Flow rate: 20 - 50 Torr l / s
(comp to . LFS injector: 20 - 150 Torr l / s,
HFS (CS) injector: 20 - 50 Torr l / s)
- Radially movable (remotely),
 $Z_{\text{SIG}}=19.8$ cm



H-mode access with SGI fueling

- Poloidal fueling location matters for the historically developed H-mode access scenarios on NSTX (R. Maingi)
- HFS-fueled LSN H-modes are most reproducible, L-H threshold lower (R. Maingi)
- XP 440 “Early H-mode” (M. Wade) produced long H-mode plasmas with LFS fueling only. Required every 2nd He conditioning shot and 5+5 min He GDC.
- Use the XP 440 template (112548) and replace the conventional LFS injector with SGI, attempt to reach higher n_e with less gas and less wall saturation
- Request 1/2 day, employ help from H-mode access and operations experts

ELM control with SGI

- ELM Type I, III, V (?) have been observed on NSTX
- Gas and pellet injection is a proven ELM mitigation technique
- Use SGI to inject D_2 and/or He to control edge power flow and/or pedestal T_e, n_e, p_e to delay ELMs, or change ELM type
- Request 1/2 day with a well-established ELMy H-mode template