MAST Developments

(in addition to diagnostics and control improvements)

EBW installation

Replacement centre stack
(37% more inductive flux; higher stresses allowed)

MAST Improved Divertor
(improved c/col armour;
smaller P2 plates;
instrumented divertor plates)

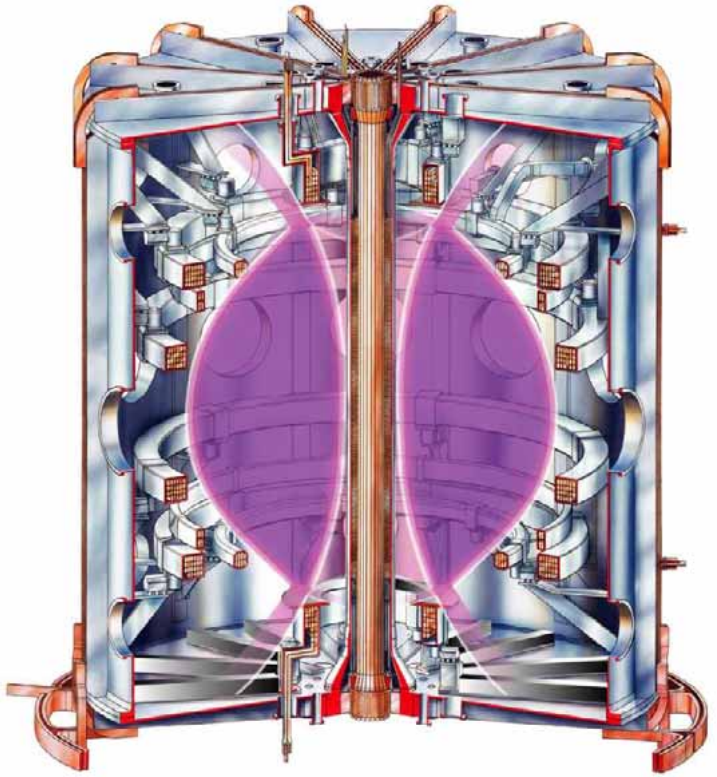
Higher plasma elongation

Higher power NBI

P2 current reversible

Higher current in P3 coils

Error field correction coils



Replacement centre stack

Installation 2003

- Improved design
- Longer solenoid
- TF: operation at ~90kA (cf 85kA) giving 0.51T at R=0.85m
- Solenoid: swing from ± 55kA (cf. ± 40kA)

EBW facility (using 60GHz ECRH)

new antenna installed Sept 2002

(TF rod current limited to > 90kA or < 78kA)

Experiments planned (V Shevchenko):

Pre - ionisation studies, ECRH heating,

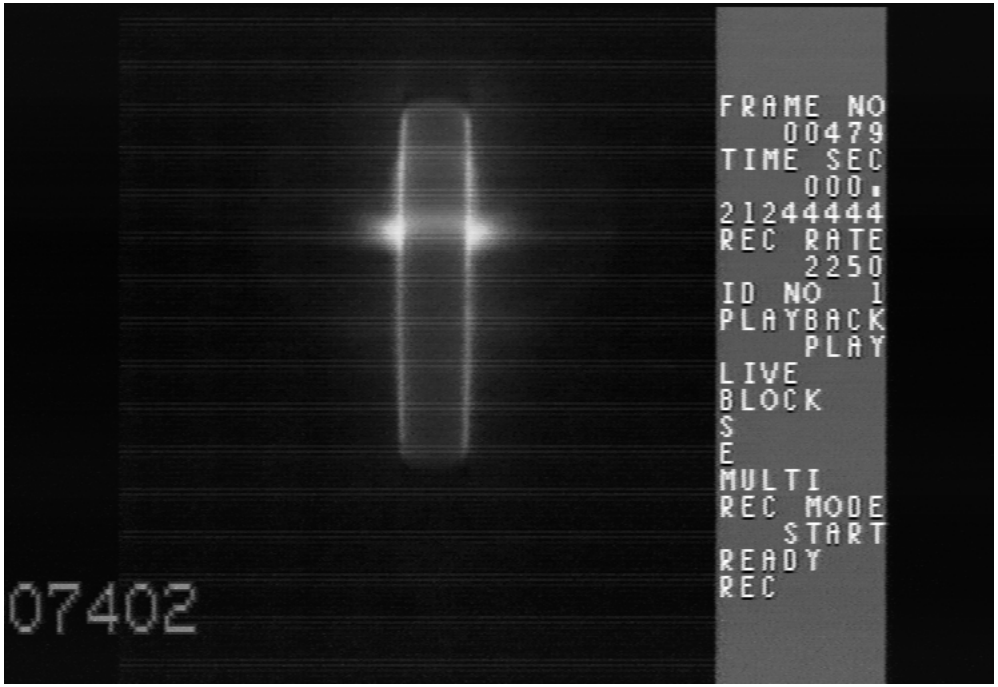
tests of Cary Forest 'bootstrap' CD scheme,

EBW heating experiments

First ECRH breakdown on MAST

6th November 2002

This used the new antenna



TF only (+gas)

60GHz ECRH, X-mode

3 x 150kW used

(up to 7 lines available)

Radius of resonance = 21cm (cf. c/col graphite radius = 20cm)

MAST NBI Programme

Present Status - 2002 (M3)

- Maximum injected deuterium beam power per injector: 1.7 MW
- Maximum total injected deuterium beam power: 2.9 MW
- Maximum beam pulse length: 300 ms

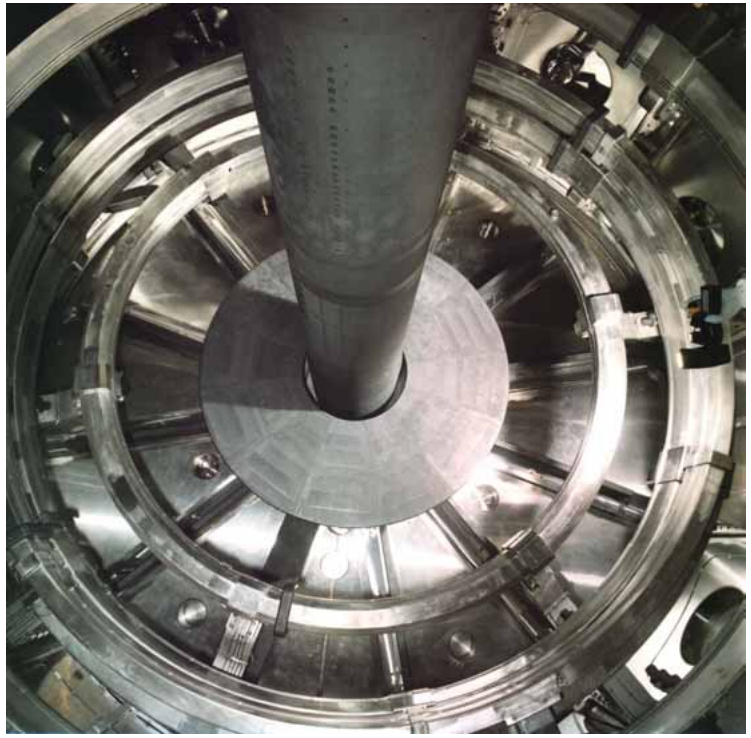
Short-Term Programme - 2002/2003 (Existing Injectors)

- Maximum deuterium beam power per injector: >2 MW
- Maximum total deuterium beam power: >4 MW
- Maximum beam pulse length >400 ms

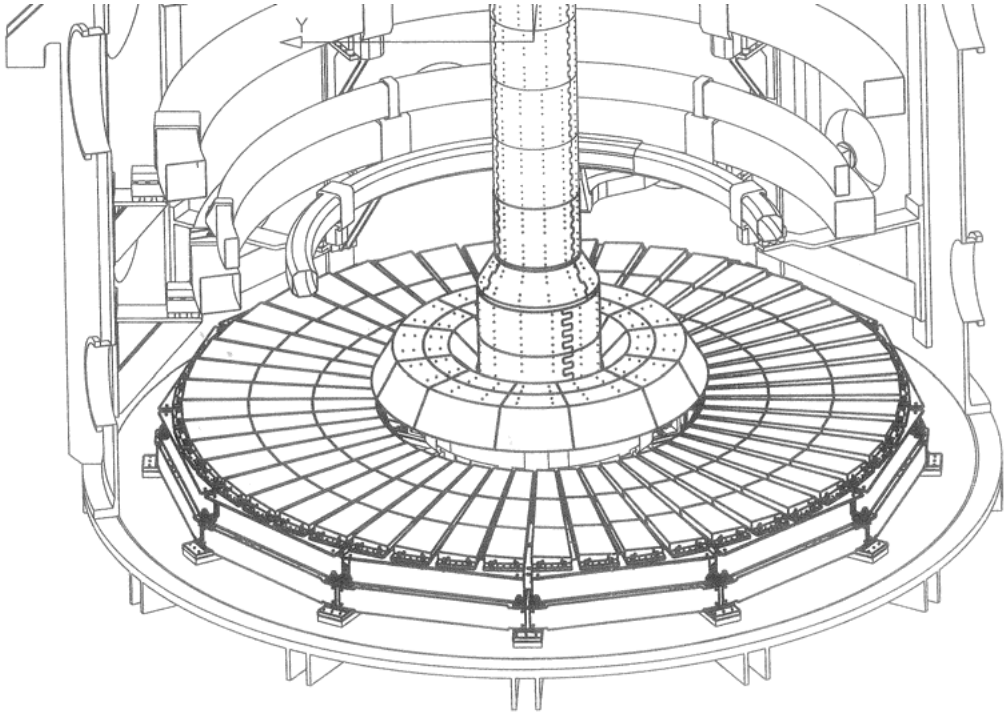
Long-Term Programme - 2004 (Upgraded Injectors)

- Maximum deuterium beam power per injector: 2.5 MW
- Maximum total deuterium beam power: 5 MW
- Maximum beam pulse length 5000 ms

MAST Improved Divertor (MID)

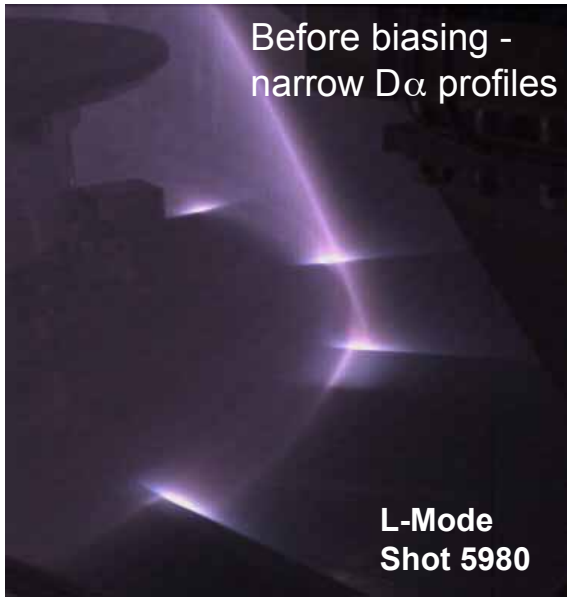


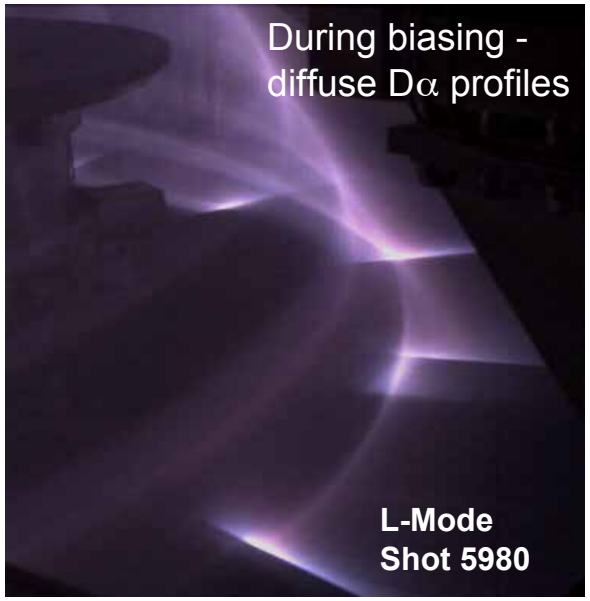
Present divertor
(simple P2 plate, ribs on tank ends)



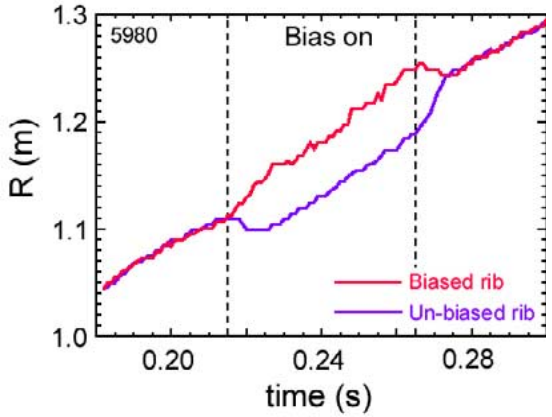
MID
shaped P2 plates; imbrocated tile divertor plates; improved c/col armour

The Improved divertor can be biassed, to continue studies begun in the M3a campaign:





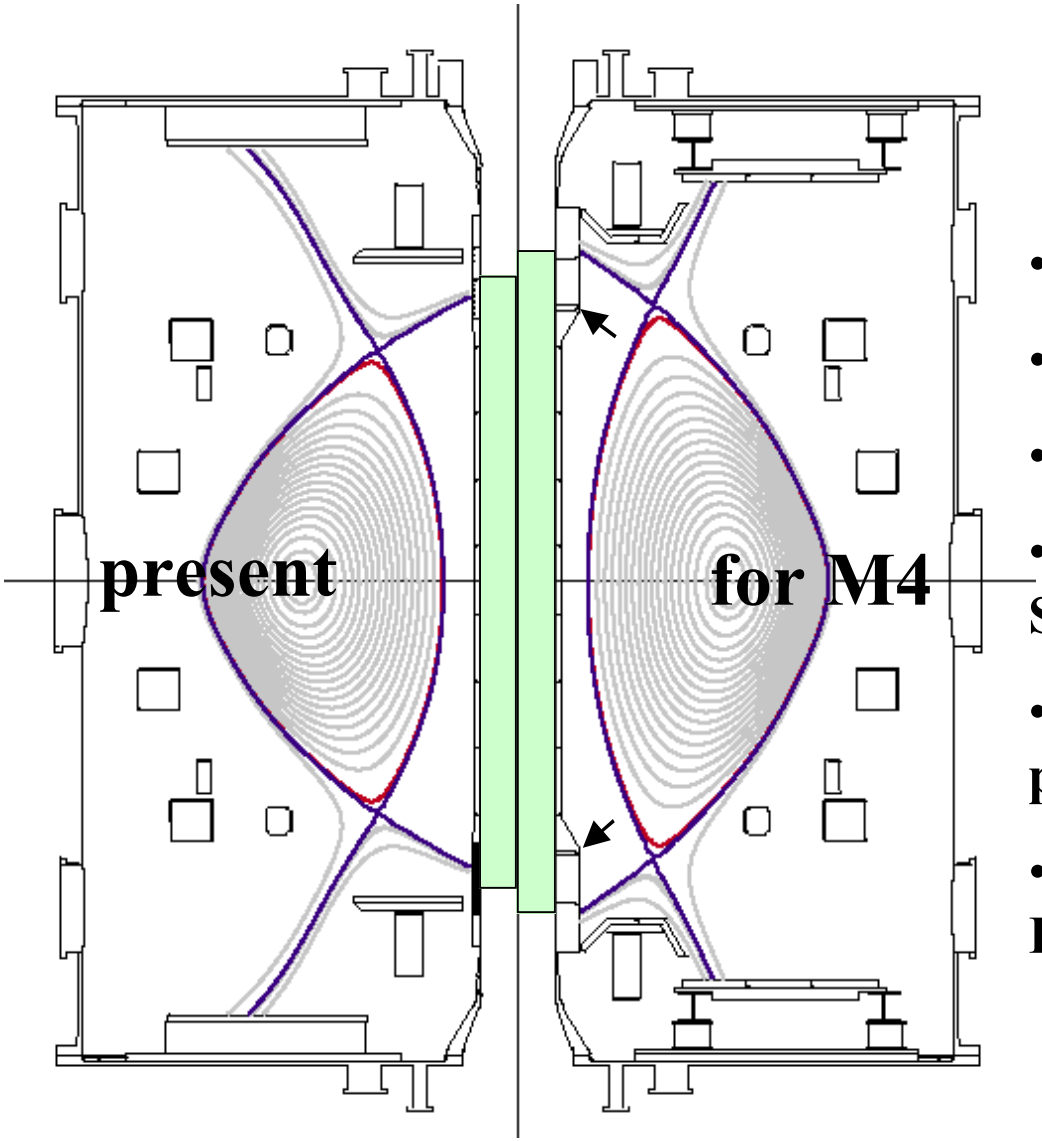
stills from High-speed colour video of lower outer target area (left) before biasing and (right) during biasing.



movement of strike point along lower outer ribs during biassing

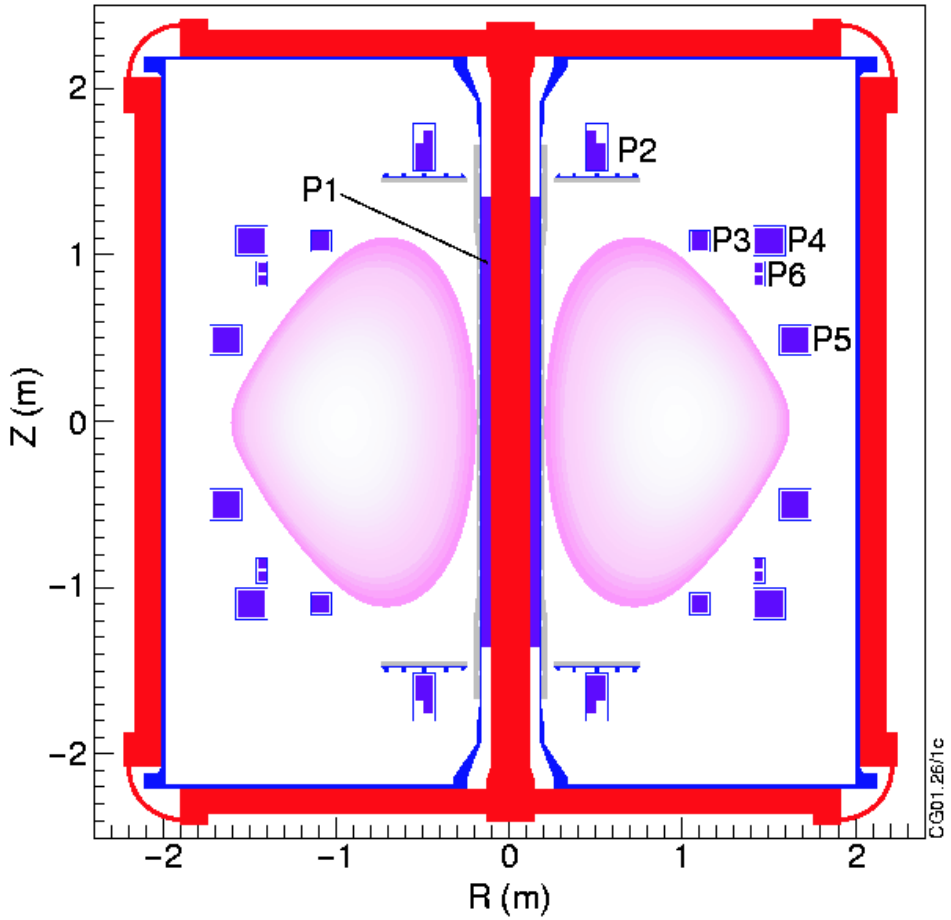
Results are in agreement with theory (COHEN, R.H., et al., Nucl. Fusion **37** (1997) 62; RYUTOV, D.D., et al., Plasma Phys. Contr. Fusion **43** (2001) 1399; HELANDER, P., et al., Proc IAEA Conf, Lyon, 2002 (Paper TH/8-1)

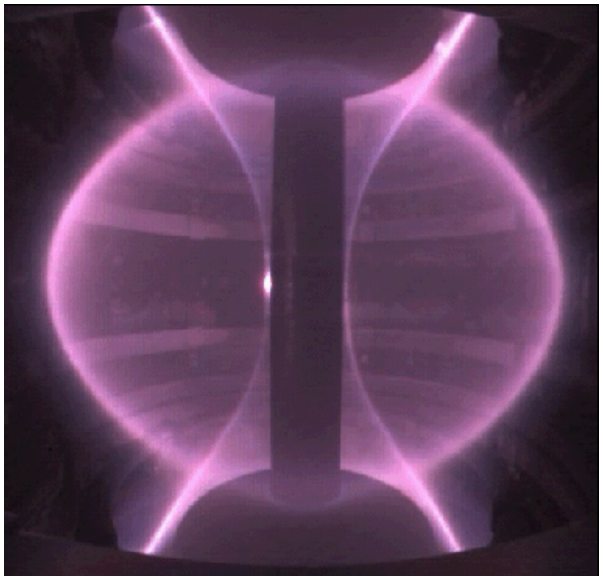
MAST layout for M4



- Longer solenoid
- P2 coils raised by 10cm
- shaped P2 armour
- larger footprint for inner SOL strike points
- controllable inner gas puff (arrowed)
- to include top launch for PI studies

Schematic of MAST





Still from colour video of typical DND plasma