1. Purpose of Experiments

1. Characterize transport in C-Mod with strong RF heating, including H-mode if achieved.
2. Contribute to international data base
3. Collect data for ”dimensionless” scaling comparisons with DIII-D and ASDEX-UG

2. Background

C-Mod operates in a unique parameter range (field and density in particular) and thus allows us to extend the international transport database. This provides a stringent test for the existing empirical scaling laws and for transport theory.

We are also collecting data for detailed comparisons with DIII-D and ASDEX-UG running dimensionally similar discharges. This requires careful matching of Bt, Ip, ne, shape, isotope, etc. The goal is to test the principle of dimensionless scaling. In addition to confinement times, all phenomena based on plasma physics (as opposed to atomic physics) should scale appropriately, (e.g. sawteeth) or be identical (profiles, etc.).

3. Approach

see experimental plan

4. Resources
4.1 Machine and Plasma Parameters

Toroidal Field: 5.2 T
Plasma Current: various
Working gas species: D2 w/ H2 minority
Density: various
Equilibrium configuration: Standard divertor
Pulse length, typical current & density waveforms: Steady state

4.2 Auxiliary Systems

RF Power, pulse length, phasing: Yes, power scan
Pellet Injection (species):
Impurity blow-off injection:
Special gas puffing:
Other:

4.3 Diagnostics

All core diagnostics including TCI, ECE, YAG, Zeff, neutrons, HIREX, Magnetics

4.4 Neutron Budget

Depends on heating efficiency - there is the potential to exceed 1e14 per shot if we are successful.

5. Experimental Plan

5.1 Run sequence plan

We are requesting 3 dedicated runs after many piggy-back runs. The dedicated runs can’t begin until high power ICRF is available and optimum plasma shape and minority fraction are determined. The dedicated runs would be devoted to parameter scans in Prf, Ip and ne. We want to fill in the full 3D matrix of these parameters. If we want approximately 4 values of each parameter this corresponds to 64 good shots - roughly 3 (good) runs.

5.2 Shot sequence plan

We will have to wait until we have initial heating results to plan at this level of detail.
6. Anticipated Results

- Publications on transport with strong ICRF heating
- Publication on H-mode with ICRF
- Joint publications with DIII-D and/or ASDEX-UG on dimensionless scaling
- Contributions to international database
- The stuff that dreams are made of

7. References