1. Purpose of Experiments
   Evaluate the performance of the fast ferrite tuning (FFT) system on the transmission line of the E-port antenna.

2. Background
   A double-stub FFT system has been built and installed on E-port. This system is designed to have capability of real-time matching. The system has been tested on a bench test at low power, but high power tests can only be done by running with plasmas.

3. Approach
   Test the FFT system on plasmas, check out its control algorithm, and its capability in handling high RF power.

4. Resources

4.1 Machine and Plasma Parameters
   Toroidal Field: 5.4 T
Plasma Current:  0.8 -1.0 MA  
Working gas species:  D2  
Density:  nl04 0.8-1.0 x 10^{20} m^{-2}  
Equilibrium configuration (if possible, refer to database equilibria): standard  
Pulse length, typical current & density waveforms, etc. Refer to database or sketch desired waveforms: standard

4.2 Auxiliary Systems

RF Power, pulse length, phasing:  All transmitters.  
Pellet Injection (species): not required  
Impurity blow-off injection:  not required  
Diagnostic Neutral Beam:  not required  
Special gas puffing:  not required  
Non-axisymmetric Coils (Connections,Current): no required  
Other:

4.3 Diagnostics

List required diagnostics, and any special setup or configuration, e.g. non-standard digitization rate.
standard setup.

5. Experimental Plan

Both sections must be filled in.

5.1 Run sequence plan

Specify total number of runs required, and any special requirements, such as consecutive days, no Monday runs, extended run period (10 hours maximum), etc.

2 run days. The first run can be piggy-back with other MPs (for example, ICRF conditioning). The 2nd run can be piggy-back with ELM studies.

5.2 Shot sequence plan

For each run day, give detailed specification for proposed shot sequence: number of shots at each condition, specific parameters and auxiliary systems requirements, etc. Include contingency plans, if appropriate.

Run 1:

shot 1-5: run E port with hundreds watts of power from Kalmus amplifier only. In this setup, we can figure out any potential bugs in the control algorithm. We also need to fine tune the existing stub so that it can have no effect on the transmission line.
shot 6-10: Run the transmitter, and raise power shot by shot.


shot 16-20: Scan density (with multiple L-H, H-L transitions) and check the FFT system limits.

Run 2:

If run 1 is successful and the FFT stays in the system, we will study the capability of matching in ELMy plasmas.

6. Anticipated Results

Discuss possible experimental outcomes and implications. Indicate if the program may be expected to lead to publications, milestone completions, improved operating techniques, etc. Indicate if the experiments are intended to contribute to a joint research effort, or an external database.

The result of the run will contribute to a presentation at the 17th RF topical conference. If the system is shown to be successful, it will greatly improve the reliability of the ICRF operation.

7. References

Include references both to external and internal literature or communications which bear on this proposal. See Section 2.

Y. Lin et al, APS2006 poster.