Subject: Lower Hybrid System Check-out and Initial operation
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Group: Lower Hybrid
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1. Purpose of Experiments
Include immediate goal of the experiments, scientific importance and/or programmatic relevance. Refer to any relevant program milestones.
Bring the lower hybrid system into plasma operation. Check-out controls and protection systems, determine compatibility with possible ICRF pick-up. Required as first step in meeting LH milestone.

2. Background
Discuss Physics Basis of the proposed research. Prior results at Alcator or elsewhere, and any related work being carried out separately.
Previous operational experience indicates the need to set the Coupler Protection System (CPS) during operation into the machine. Some power conditioning will be required to reach levels required for experiments. We would like to verify the reproducibility of the phase setting as compared to last operations period and to verify that signal interference from the ICRF system has been eliminated.

3. Approach
Describe the methodology to be employed; explain the rationale for the choice of parameters, etc. Describe the analysis techniques to be employed in interpreting the data, if applicable. If the approach is standard or otherwise self-evident, this section may be absorbed into the Experimental Plan.
Establish standard LH discharge (e.g. 1060727012). Disable tripping function of CPS system. Establish low power (0.1-0.2 MW) rf pulse (t_pulse ~0.2s). Ramp density during rf pulse (by ~factor of 2-3) to cause enough reflection increase to engage CPS trip levels. Set CPS points for proper protection. Re-engage CPS system. Raise power to levels required for physics experiments (0.5 – 1.0 MW) Perform phase scan co and ctr to verify...
reproducibility to last year. Operate in conjunction with ICRF pulses to verify compatibility. Use different sources as necessary to establish interferences, if any.

4. Resources

4.1 Machine and Plasma Parameters

Give values or range for:

Toroidal Field: 5.4 T
Plasma Current: 0.5 – 1.0 MA
Working Gas Species: D
Density: nel04 0.4-1.5 x 10e20
Equilibrium configuration (if possible, refer to database equilibria): LSN low density L-mode shot 1060727012

4.2 Auxiliary Systems

RF Power, pulse length, phasing: ICRF low power short pulse, any phase, LH 0.1-1.0 MW
Pellet Injection (species): no
Impurity blow-off injection: no
Diagnostic Neutral Beam: if available
Special gas puffing: no
Non-axisymmetric Coils (Connections, Current): no
Other:

4.3 Diagnostics
List required diagnostics, and any special setup or configuration, e.g. non-standard digitization rate.
Magnetics, LH xray diagnostic, ECE,

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.
About 10 shots total for the signal checkout but may take multiple days if iteration on electronics required. Conditioning to high power may require 20 shots

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.
Begin in standard pure ctr 90 degree phasing disable CPS
Establish operations at minimum of 100 kW 200 ms pulses (1-3 shots)
Vary plasma density during pulse (ramp nel04 from ~0.4-1.2 x10e20 (if possible) or if not adequate to trip CPS vary plasma position (outer gap) to verify CPS operation (trip annunciation) (1-3 shots)
Reset CPS as necessary (requires cell access)
If necessary repeat shot to verify CPS trip points (1-3 shots)
Take shot with ctr 60-90-120 phase settings (1 shot)
Reset toco phase (requires cell access)
Take shot at -60, -90, -120 phase to verify symmetry of phasing in reflection co-efficient (1 shot)
Add ICRF minimum pulse ~0.02 s , try different antennas power up to 1 MW ~5 shots
Raise LH power in ~100 steps to maximum (10-15 shots)

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.
LH system will be qualified for physics experiments

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