1. Purpose of Experiments
Include immediate goal of the experiments, scientific importance and/or programmatic relevance. Refer to any relevant program milestones.

In order of importance:

- Verify operational status of Compact Neutral Particle Analyzer (CNPA)
- Calibrate CNPA aperture and signal levels as a function of plasma density and ICRF power
- Determine density operational limits of CNPA
- Study ICRF hydrogen tail ions at low densities

2. Background
Discuss Physics Basis of the proposed research. Prior results at Alcator or elsewhere, and any related work being carried out separately.

The CNPA is designed to diagnose ICRF hydrogen tails at low to moderate plasma densities by pulse-height analysis (PHA) of charge-exchanged (CX) neutrals from the diagnostic neutral beam (DNB). The CNPA uses a compact silicon diode as its detector, and should be able to discern particles above \( \sim \)20keV with a resolution of 20keV.

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.

See Experimental Plan

4. Resources
4.1 Machine and Plasma Parameters

Give values or range for:

- Toroidal Field: 5.3T
- Plasma Current: 800kA
- Working Gas Species: D, H
- Density: \( n_e \sim 0.4 \text{-} 0.8 \times 10^{20} \)
- Equilibrium configuration (if possible, refer to database equilibria): single-null L-mode

4.2 Auxiliary Systems

- RF Power, pulse length, phasing: 1-3MW Steady State (4-5 also if available)
- Pellet Injection (species): no
- Impurity blow-off injection: no
- Diagnostic Neutral Beam: yes
- Special gas puffing: no
- Other:

4.3 Diagnostics

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

All core diagnostics

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.

1/2 day should be enough

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.

To start with, a low density (\( n_e \sim 0.6 \times 10^{20} \)), L-mode, D(H) plasma with constant RF, constant current, and low hydrogen levels (optimally \( \sim 1\text{-}4\% \), or ALARA) should be used to verify that the CNPA is receiving a signal when the DNB is on. If required, the aperture should be adjusted with a cell access so that a \( \sim 200,000/s \) count rate is achieved. After this, a density and power scan can be performed, and the CNPA density operational limit can be determined.

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.

Verification of CNPA operation should be achieved. The tail ion temperatures found during the scan will likely followed expected trends. However, based on previous experiments, the tail temperatures might fall short of the FPPRF predicted results.

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