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

Initial results on 1000829 with the A-port fast scanning magnetic probe showed clear 
measurements of the Quasi-Coherent (QC) mode in EDA H-mode at about 120 kHz that 
correlated with the Langmuir probes on the same probe head. However, the PCI was 
unavailable at that time. Since the $k_\theta$ inferred from the radial decay of the magnetic 
fluctuations was lower than the $k_R$ from previous PCI measurements, we need to measure 
both $k$ values simultaneously to determine if there is a discrepancy and try to resolve 
it. This experiment should help give us a better understanding of the QC mode in EDA 
H-mode.

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

Previous results were obtained with the fast scanning magnetic probe on 1000829 
showing a clear magnetic signature to the Quasi-Coherent mode in Ohmic EDA H-mode. 
The inferred $k_\theta$ was 1.5 cm$^{-1}$ while the typical $k_R$ from PCI measurements is 6 cm$^{-1}$. 
However, the $k_R$ values from PCI appear to be proportional to the toroidal field, so further 
measurements need to be made with both the PCI and the magnetic probe operating to 
be able to compare these wavenumbers directly.

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.

A comparison will be made of the inferred poloidal and radial wavenumbers measured 
by the radial decay of the magnetic quasi-coherent fluctuations from the magnetic probe
and from the PCI diagnostic in low field, low power, Ohmic EDA H-modes as well as in normal field (5.3 T) ICRF EDA H-modes. Since the magnetic signature of the QC mode can be measured as far away as 2 cm outside the LCFS, we may be able to get reasonable magnetic fluctuation data even in ICRF EDA H-modes from the fast scanning magnetic probe without getting too close to the plasma and burning up the probe.

4. Resources

4.1 Machine and Plasma Parameters

Give values or range for:

Toroidal Field: 3 - 5.4 T
Plasma Current: 0.6 - 0.9 MA
Working gas species: D2
Density: $1.2 \times 10^{20} \text{ m}^{-3}$

Equilibrium configuration (if possible, refer to database equilibria): e.g., 1000829029 (Ohmic) and 1000914004 (ICRF)

Pulse length, typical current & density waveforms, etc. Refer to database or sketch desired waveforms: flattop to 1.5 s

4.2 Auxiliary Systems

RF Power, pulse length, phasing: 2 - 2.5 MW, 0.8 s, $0\pi0\pi$
Pellet Injection (species):
Impurity blow-off injection:
Diagnostic Neutral Beam:
Special gas puffing:
Other:

4.3 Diagnostics

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

The A-port fast scanning magnetic probe and the PCI diagnostic must be operational. The reflectometer would be useful as well as other fluctuation diagnostics such as the magnetic pick-up coils. They should be sampled at 1 MHz.
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.

While these shots could be run in piggy-back mode, since the turn-around time of the A-side fast scanning probe head is about 2 weeks, we need to have the magnetic probe run scheduled so that we can be sure to get the kind of plasmas we need when the magnetic head is on the probe drive. The PCI diagnostic must also be operational. We would like to compare both Ohmic H-modes at low field and standard ICRF heated EDA H-modes. So, we would like at least one half of a run day and preferably a whole run day to explore the magnetic field scaling of the QC wavenumbers. If time permits, we would like to get three or four different toroidal field points to see the wavenumber scaling with field.

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.

Start with 1000829029 (0.77 MA, 3.2 - 3.7 T ramp, nl04 = 0.85 \times 10^{20} \text{ m}^{-2}) and scan the A-side fast scanning magnetic probe (FSMP) say at 0.8, 1.0, and 1.2 s to get three scans in H-mode (2 - 3 shots). Then, try 0.67 MA and 2.7 T minimum ramping to 3.2 T and repeat the scans if long H-modes can be obtained at the lower field and current (2 - 3 shots). Then, raise the current and field to 0.87 MA and 3.6 T ramping to 4.2 T again trying to maintain long H-modes at somewhat higher field (2 - 3 shots).

Return to a standard ICRF long EDA H-mode such as 1000914004 and again scan the FSMP at 1.0, 1.2, and 1.4 s in H-mode. Start by scanning the probe to a depth of about 1.8 cm from the LCFS (2 - 3 shots). If there are no indications of probe heating or extra radiation at the probe insertion times, we may scan the probe deeper to between 1.0 and 1.5 cm outside the LCFS to improve the fit to the radial decay of the fluctuations to better determine the poloidal wavenumber (2 - 3 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.

These results should help us to better understand the nature of the quasi-coherent mode and should lead to one or two publications concerning the scaling of the wavenumber of the QC mode.

7. References

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