1. Purpose of Experiments
   Include immediate goal of the experiments, scientific importance and/or programatic relevance. Refer to any relevant program milestones or ITER R&D commitments.

   Measure temperature fluctuation profile with new ECE system installed on port F. The system now has additional channels with closely spaced frequency filters for correlation calculations. This run will allow for the initial interior measurements to look for temperature fluctuations in the temperature gradient region.

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

   Calculations of the electrostatic fluctuation-induced heat transport fluxes require local fluctuation measurements of the electron temperature. Previous measurements of electron temperature fluctuations have been made on TEXT-U and other toroidal devices. Applying electron cyclotron emission (ECE) correlation techniques to the new high resolution heterodyne ECE system on Alcator C-Mod will allow extraction of time-averaged temperature fluctuation amplitudes. Present capabilities are 8 correlation channels (4 correlation pairs) per shot. This run will be comparable to previous measurements on other machines and will set the base measurements for future perturbation and transition experiments (RF, L to H mode transitions, sawtoothing discharges, etc).

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

   The parameters for choosing the initial profile measurements are standard for most ECE correlation experiments: a constant toroidal magnetic field and plasma current to hold the resonance positions constant, low plasma currents to lessen sawtoothing effects on correlation processing, and long flattops and little perturbations to allow for less shots
needed in multishot averaging. Medium constant density ($n_e \leq 2.0 \times 10^{20}/m^3$) would lessen refractive effects. Optionally added RF power below H-mode threshold levels later in the shot will allow us to compare to ohmic L-mode. I estimate about 10 shots at a particular toroidal magnetic field will be enough to ensure reasonable statistics from the correlations. This will give us four points on a profile.

If there is extra time, we could have a “quick” cell access to change the filter positions, or switch to a different toroidal field to move the resonance positions.

4. Resources

4.1 Machine and Plasma Parameters

Give values or range for:

**Toroidal Field:** 5.4 T (5.3 - 6.0 Tesla possible)

**Plasma Current:** 600 - 800 kA

**Working gas species:** Deuterium

**Density:** $n_e \leq 2.0 \times 10^{20}/m^3$

**Equilibrium configuration** (if possible, refer to database equilibria):

**Pulse length, typical current & density waveforms, etc.** Refer to database or sketch desired waveforms: similar to shot 990305016

4.2 Auxiliary Systems

**RF Power, pulse length, phasing:** optional enough power to keep below H-mode threshold, start at $\approx 0.750$ sec for at least 0.250 sec.

**Pellet Injection (species):** no

**Impurity blow-off injection:** possible late in discharge (after our sampling is complete).

**Special gas puffing:** ditto above

**Other:**

4.3 Diagnostics

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

4.4 Neutron Budget

Estimate the neutron dose rate at the site boundary. Give basis for estimate. (Once some experience has been gained a standard formula will be provided for estimating dose rates.)

I assume this will be low.
5. Experimental Plan

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.

I anticipate less than one day of run time with 15 shots taken at a particular toroidal
field strength. If perturbation experiments are included late in the discharge, this will
increase the amount of shots required unless the perturbations can be done later in the
shot after our sampling has occurred. Our measurements take 256k sample/channel, so for
sampling at 500 kHz, perturbation can occur $\approx 0.5$ sec after our sampling trigger (typically
0.5 sec or check $\backslash$ELECTRONS::TOP.FRCECE.SETUP:ECEF_TRIG).

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 contin-
gency plans, if appropriate.

15 shots at 5.4 T (or 5.3 T) (possibly only 10 shots with 5 more shots at higher toroidal
field [up to 5.7 T])

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.

This experiment will map out the temperature fluctuation amplitude profile for the
“standard” C-Mod shot sequence. This can be compared to future perturbation experi-
ments.

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


Ouroua, J. W. Heard, T. P. Crowley, P. M. Schoch, D. L. Brower, Y. Jiang, B. Deng, C.