Subject: Measurement of Te fluctuations in the plasma periphery with and O-Mode Radiometer

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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 or ITER/TPX R&D commitments.

   Measure Te fluctuations with the existing O-Mode radiometer. In principle, Te fluctuations provide a means for obtaining high spatial resolution of the plasma turbulence. The present system is configured for measurement of temperature fluctuations, but an optimized system will only be available during the next campaign. In preparation for the later work, we would like to use the present system to measure temperature fluctuations.

   The present system has two limitations that can be overcome during a few dedicated shots. Some spatial channels are outside the plasma for normal toroidal field. The poloidal spatial resolution can be improved. We will do the experiments at 5T so that all channels are moved inside the separatrix. We will vary the ECE aperture to three different values to experiment with modifications in the poloidal spatial resolution and take about two shots at each aperture value.

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

   Te fluctuations have been used successfully to identify the detailed phenomenology of turbulence. For example, on TEXT, poloidal distributions were identified and characterized. Radial resolution is the best for core turbulence measurements. Analysis is relatively straightforward.

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 present system has two limitations that can be overcome during a few dedicated shots. Some spatial channels are outside the plasma for normal toroidal field. The spatial resolution can be improved. We would like to do the experiments at 5T so that all channels are moved inside the separatrix. We would like to vary the aperture to three different values to improve the spatial resolution and take about two shots at each aperture value. This will have the affect of reducing signal levels and losing the absolute calibration of the other ECE diagnostics during these discharges which is one reason for requesting dedicated discharges.

The data analysis is based on Fourier transforms and on cross correlation of neighboring ece channels. The analysis is by now fairly standard.

4. Resources

4.1 Machine and Plasma Parameters
Give values or range for:

**Toroidal Field:** 5T

**Plasma Current:** any consistent with other experiments conducted before/after

**Working gas species:** D

**Density:** low density, ne-bar less than 1.3e20

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

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

4.2 Auxiliary Systems

**RF Power, pulse length, phasing:** none during 0.5 s exp period

**Pellet Injection (species):** none

**Impurity blow-off injection:** none

**Special gas puffing:** none

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.)
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.

6 shots. Could be piggybacked on another low BT, low ne run

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.

2 shots, normal aperture (3 by 5 cm)
2 shots, minimum aperture (1 cm)
2 shots, intermediate

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.

Establish poloidal resolution for significant Te fluctuations

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