Design and Calibration of Thomson Scattering Diagnostic for TCSU

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Physics Laboratory — A single pulse ruby laser Thomson scattering system is being
designed and installed to measure the electron temperature $T_e$ and density $n_e$ profiles
in a Rotating Magnetic Field (RMF) driven FRC plasma. Based on measurements
that show the total temperature is about 150 eV and the density is about $10^{19} \text{ m}^{-3}$
in the Translation, Confinement and Sustainment Upgrade (TCSU) experiment, a $T_e$ of about 100 eV is expected. The system allows observation of 5 points on the
bottom half section of the 40 cm radius TCSU device. Each spatial point is re-
solved with a GA polychromator attached to three PPPL pre-amplifier modules. A
model to relate the fast and slow channel of the pre-amplifier followed by a spectral
calibration of the polychromator characterizing the transmission of the bandpass in-
terference filters is described. The overall system design will be discussed and initial
results may be presented.