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Elucidating turbulence dynamics with advanced flow and electric field diagnostics in the large-scale, low temperature, EC heated Texas Helimak plasma[1] W.L. ROWAN, K.W. GENTLE, ALVARO GARCIA DE GORORDO, G.A. HALLOCK, Institute for Fusion Studies, The University of Texas at Austin — Understanding flow shear is essential to most applications of fluid dynamics in that it generally leads to instability and turbulence in three-dimensional flows. However, in a magnetized plasma – where the equations can often be reduced to two dimensions, shear in the plasma flow velocity transverse to the magnetic field is a very general mechanism for stabilizing turbulence. This theoretical concept is widely invoked, but demonstrations of correlation between flow shear and turbulence suppression in controlled experiments are few. This presentation describes the new research opportunities offered in this area by the The Texas Helimak experiment and its diagnostics. Sharply focused experiments on this novel device require advanced diagnostics. Plasma flow is measured with an imaging spectrometer. More than a hundred Langmuir probes measure turbulence, plasma temperature, plasma density, and electric field. A heavy neutral beam was constructed and is capable of high resolution plasma potential measurements in the plasma. Additional spectroscopic diagnostics are used for supplementary measurement of temperature and density. The data is acquired, stored, and made available within a framework that can be maintained and upgraded by scientists and students.

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