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Turbulence and Fusion at the Tri-Co: Plasma Research at Bryn Mawr College and Swarthmore College[1]

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Existing and planned experiments at Swarthmore College and Bryn Mawr College focus on the physics of magnetohydrodynmaic (MHD) turbulence and magneto-inertial fusion (MIF). In the Swarthmore Spheromak Experiment (SSX) at Swarthmore College, dynamic magnetized plasma is generated using a plasma gun source and launched into a long cylindrical tube called the plasma wind tunnel. The turbulent nature of this plasma is investigated through statistical analyses of measured magnetic and velocity fluctuations. An upgraded turbulence experiment is in development at Bryn Mawr College focusing on generating long-pulse, highly spatially-resolved turbulent plasma. Results of these turbulent analyses are compared to satellite observations of the solar wind and edge turbulence in the Large Plasma Device (LAPD) at UCLA. The end-state state of this turbulent process is a helically twisted magnetic structure called a Taylor state. The structure is being investigated as both a potential driver and a target for magneto-inertial fusion through the ARPA-E ALPHA program.

[1]DOE FES, ARPA-E ALPHA