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Turbulence dynamics during the transition to fully developed broadband turbulence in the Controlled Shear Decorrelation eXperiment - Upgrade (CSDX-U) SAIKAT CHAKRABORTY THAKUR, CHRISTIAN BRANDT, LANG CUI, JORDAN GOSSELIN, Center for Energy Research, UC San Diego, ADAM LIGHT, Center for Integrated Plasma Studies, Univ. of Colorado, Boulder, CHRIS HOLLAND, GEORGE TYNAN, Center for Energy Research, UC San Diego — Recent upgrades to the linear plasma device Controlled Shear Decorrelation Experiment (CSDX) at UCSD (maximum B_z upgraded from 1000 G to 2400 G and helicon source diameter increased from 10 cm to 15 cm) have revealed a rich array of turbulence dynamics at previously inaccessible conditions. Here we report the detailed dynamics during the transition from nonlinearly coupled but distinct eigenmodes at less than 900 G to fully developed broadband turbulence at 2400 G in argon plasma. Diagnostics include properly biased Langmuir probe arrays, Mach probes, optical emission spectroscopy and fast framing camera. We observe a slow smooth increase in the nonlinear dynamics of the system from 400 G to about 1300 G, followed by a very sharp transition (within 100 G) to a centrally peaked density with stiff profiles and very bright blue core mode. Thereafter there is another slow increase in the nonlinear dynamics until fully developed broadband turbulence is achieved at 2400 G.

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