

Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Disruption Event Characterization and Forecasting in NSTX-U

S.A. SABBAGH, J.W. BERKERY, J.M. BIALEK, Y.S. PARK, Columbia U., R.E. BELL, M.D. BOYER, S.P. GERHARDT, C. MYERS, PPPL, J.D. RIQUEZES, U. Michigan — Disruption avoidance with high reliability is a critical need for future fusion-producing tokamaks. Reaching this challenging goal will require multiple approaches including an understanding of the connection between events leading to disruptions. Automated disruption event chain characterization and forecasting (DECAF) analysis has started for NSTX-U by first analyzing NSTX data. The relative timing of global MHD instabilities such as resistive wall modes (RWM), rotating MHD modes, vertical displacement events, and several other events including mismatching the desired plasma current, loss of boundary control, and safety factor reduction is considered. In a database of plasmas exhibiting global MHD mode activity, the RWM and loss of boundary control events are found in all cases, and vertical displacements events are found in 90% of cases. The earliest RWM events occur within 20 conducting wall current diffusion times of full current quench disruptions in 60% of the plasmas and apparent false positives are often identified as minor disruptions. Common disruption event chains are identified, with new insights gained on the connection of mode activity to events such as reaching high Greenwald density fraction. *Supported by US DOE Contracts DE-FG02-99ER54524 and DE-AC02-09CH11466.

Steven Sabbagh
Columbia U. / PPPL

Date submitted: 25 Jul 2016

Electronic form version 1.4