Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

**Plasma stability analysis using Consistent Automatic Kinetic Equilibrium reconstruction (CAKE)**[1] MATTHIJS ROELOFS, Technische Universiteite Eindhoven, EGEMEN KOLEMEN, Princeton University, Princeton, New Jersey 08544, DAVID ELDON, General Atomics, ALEX GLASSER, Princeton University, Princeton, New Jersey 08544, ORSO MENEGHINI, STERLING P. SMITH, General Atomics — Presented here is the Consistent Automatic Kinetic Equilibrium (CAKE) code. CAKE is being developed to perform real-time kinetic equilibrium reconstruction, aiming to do a reconstruction in less than 100ms. This is achieved by taking, next to real-time Motional Stark Effect (MSE) and magnetics data, real-time Thomson Scattering (TS) and real-time Charge Exchange Recombination (CER, still in development) data in to account. Electron densities and temperature are determined by TS, while ion density and pressures are determined using CER. These form, together with the temperature and density of neutrals, the additional pressure constraints. Extra current constraints are imposed in the core by the MSE diagnostics. The pedestal current density is estimated using Sauters equation for the bootstrap current density. By comparing the behaviour of the ideal MHD perturbed potential energy ($\delta$W) and the linear stability index ($\Delta$') of CAKE to magnetics-only reconstruction, it can be seen that the use of diagnostics to reconstruct the pedestal have a large effect on stability.

[1]Supported by U.S. DOE DE-SC0015878 and DE-FC02-04ER54698

Florian Laggner
Princeton University, Princeton, New Jersey 08544

Date submitted: 12 Sep 2017 Electronic form version 1.4