

New <u>DPFD ML Software</u> trained with ~2,000 data samples from JET with similar prediction performance to JET's APODIS code trained with ~2,000,000 data samples;
Increased "false" alarms allow associated chains to be analyzed for useful additional information on disruption precursors.

## **Big Data Machine Learning Disruption Predictions**

 (i) What has the fusion community achieved over past two years using Machine Learning?
 A new ML predictive tool for disruptions is now capable of developing more advanced physicsbased predictors.

(ii) Where does fusion R&D stand right now?
Key current R&D goals: (1) achieve better than 95% predictive accuracy by moving beyond
0-D time trace analysis to higher-D to ensure higher physics fidelity; and (2) establish crossmachine portability of predictive software beyond JET to other tokamak systems.

(iii) Which critical issues, next steps &
Challenges demand attention to avoid gaps/ delays on way to the final goal?
Critical issues/major challenges to this urgent goal include Identification of new, higher-D physics classifiers such as Neoclassical Tearing Modes (NTM's) & deployment of powerful new ML methods such as Deep Learning Recurrent Neural Nets (RNN's) to help mitigate failure risks.