



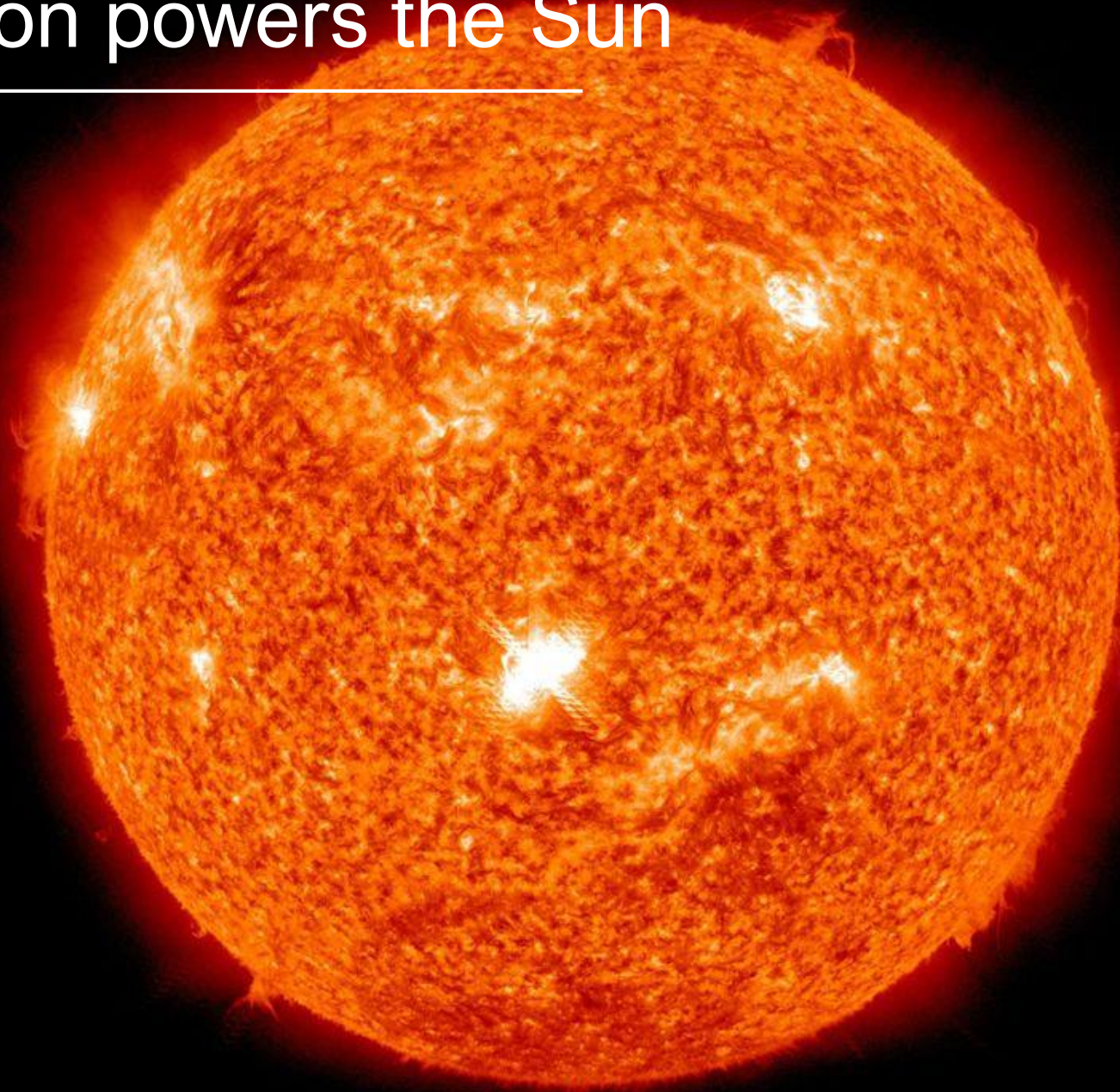
AI meets Nuclear Fusion

Diogo R. Ferreira

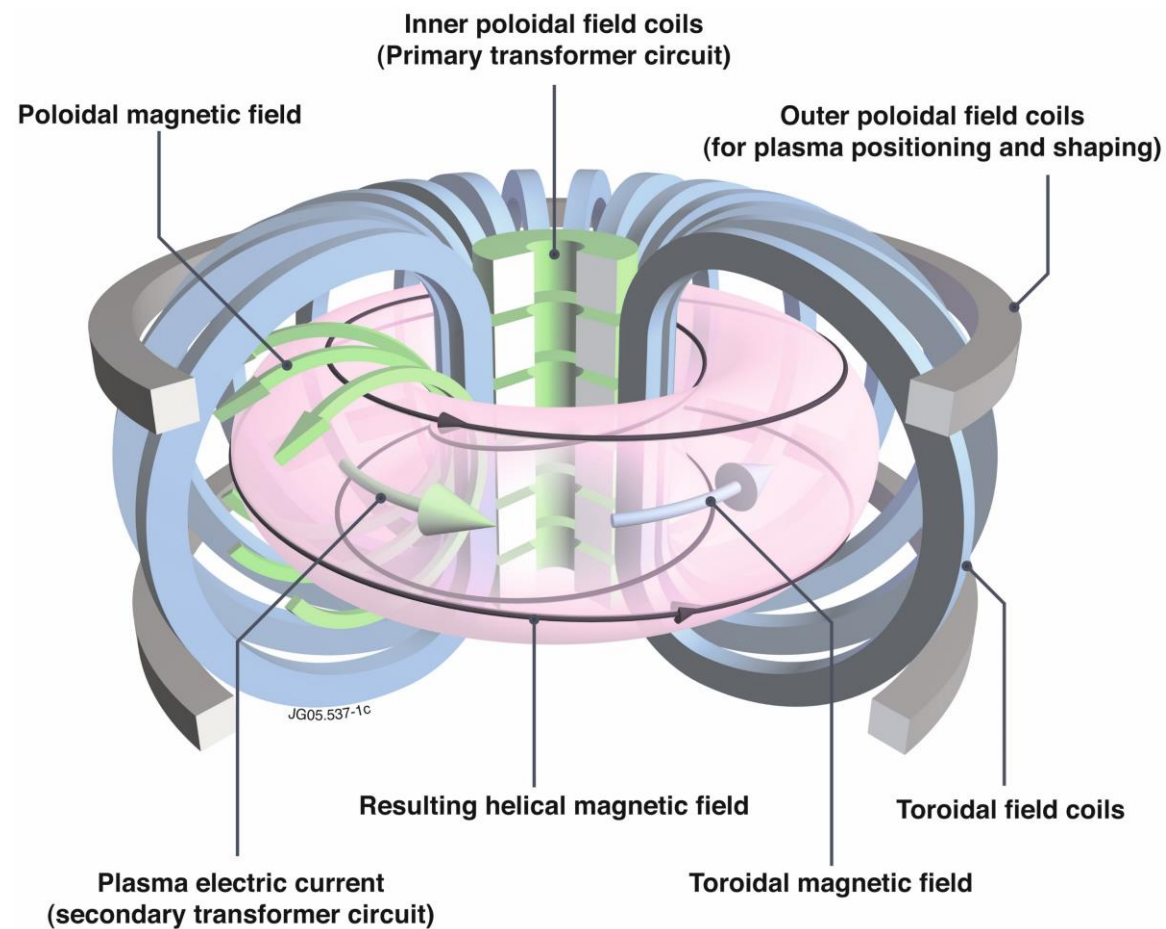
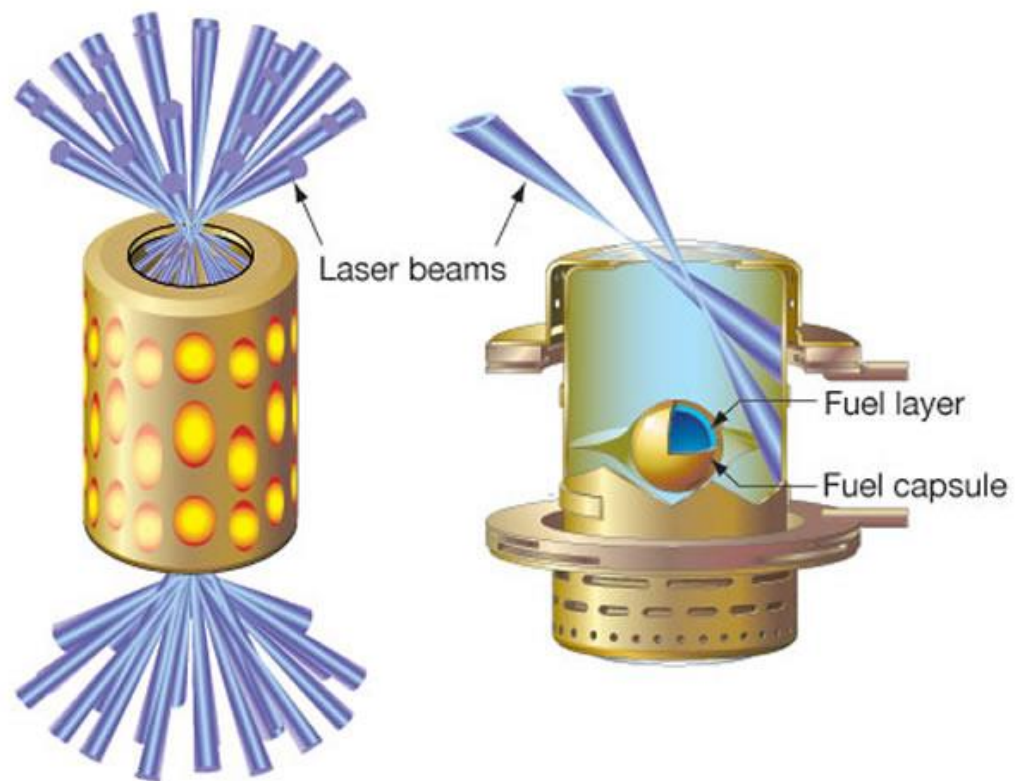
IST, University of Lisbon, Portugal

diogo.ferreira@tecnico.ulisboa.pt

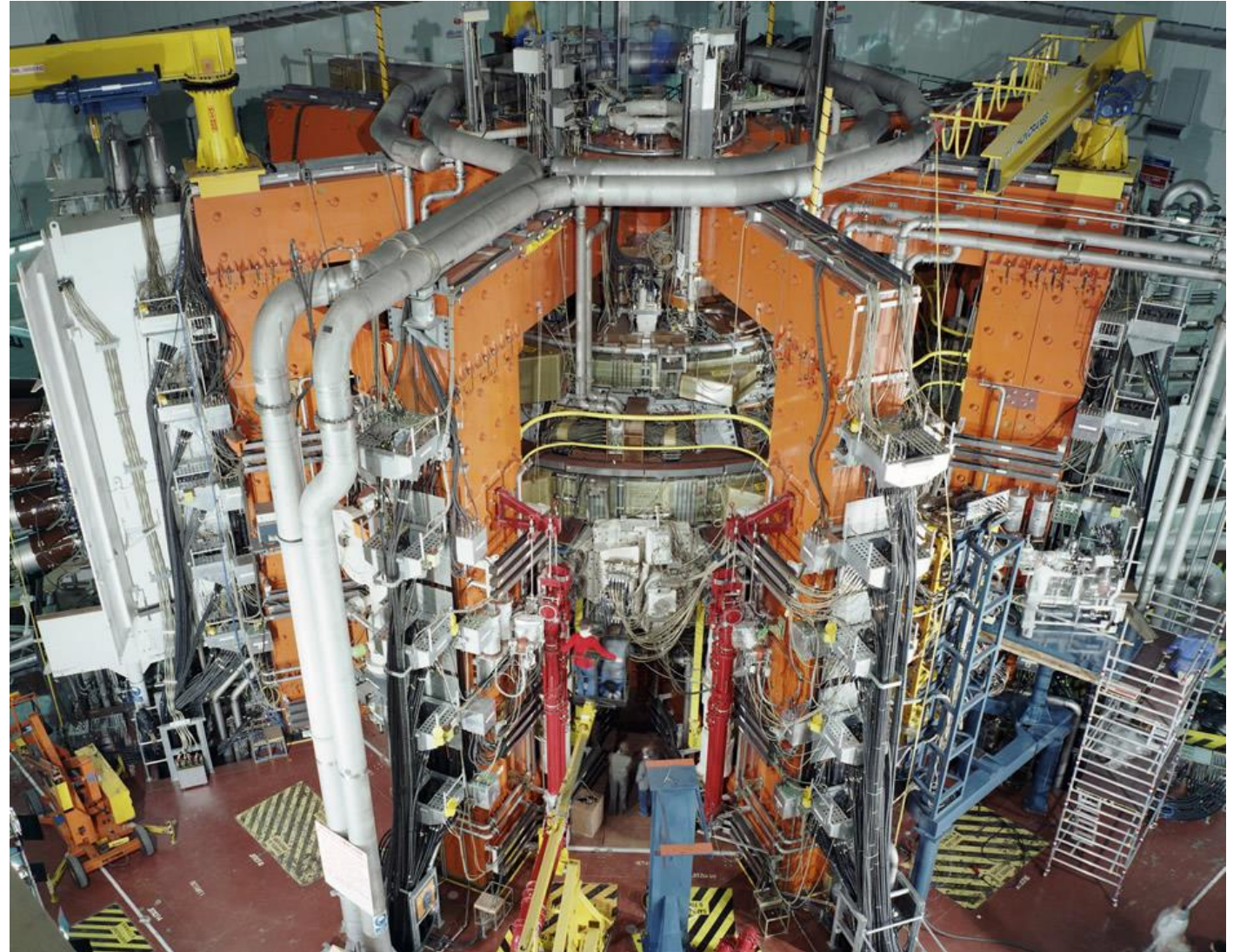
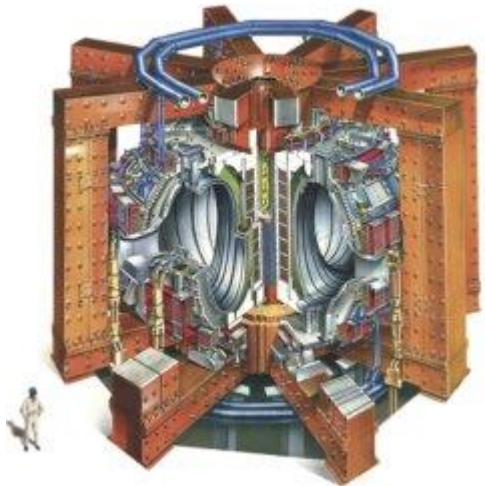
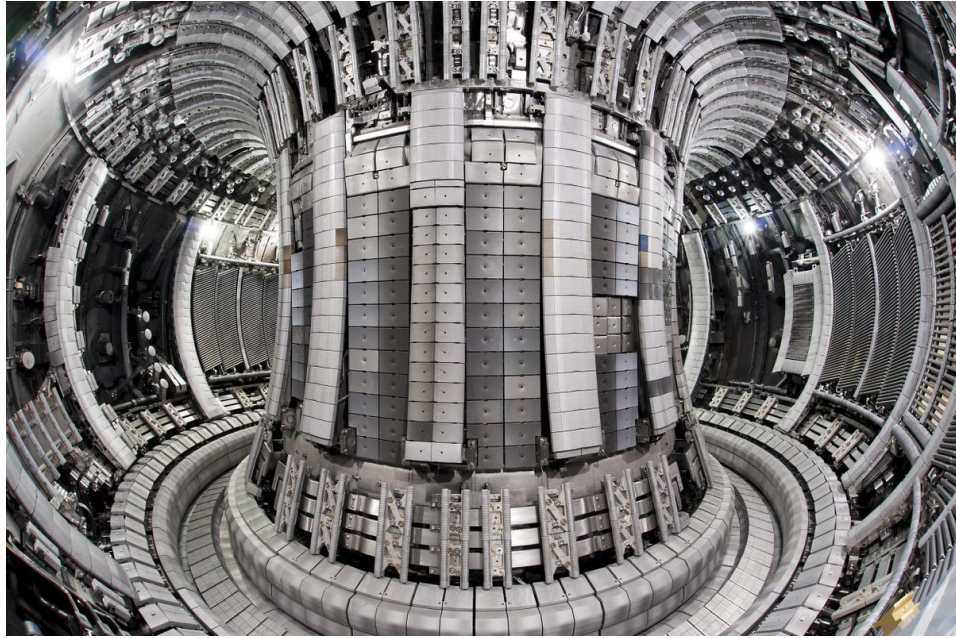
Nuclear fusion powers the Sun



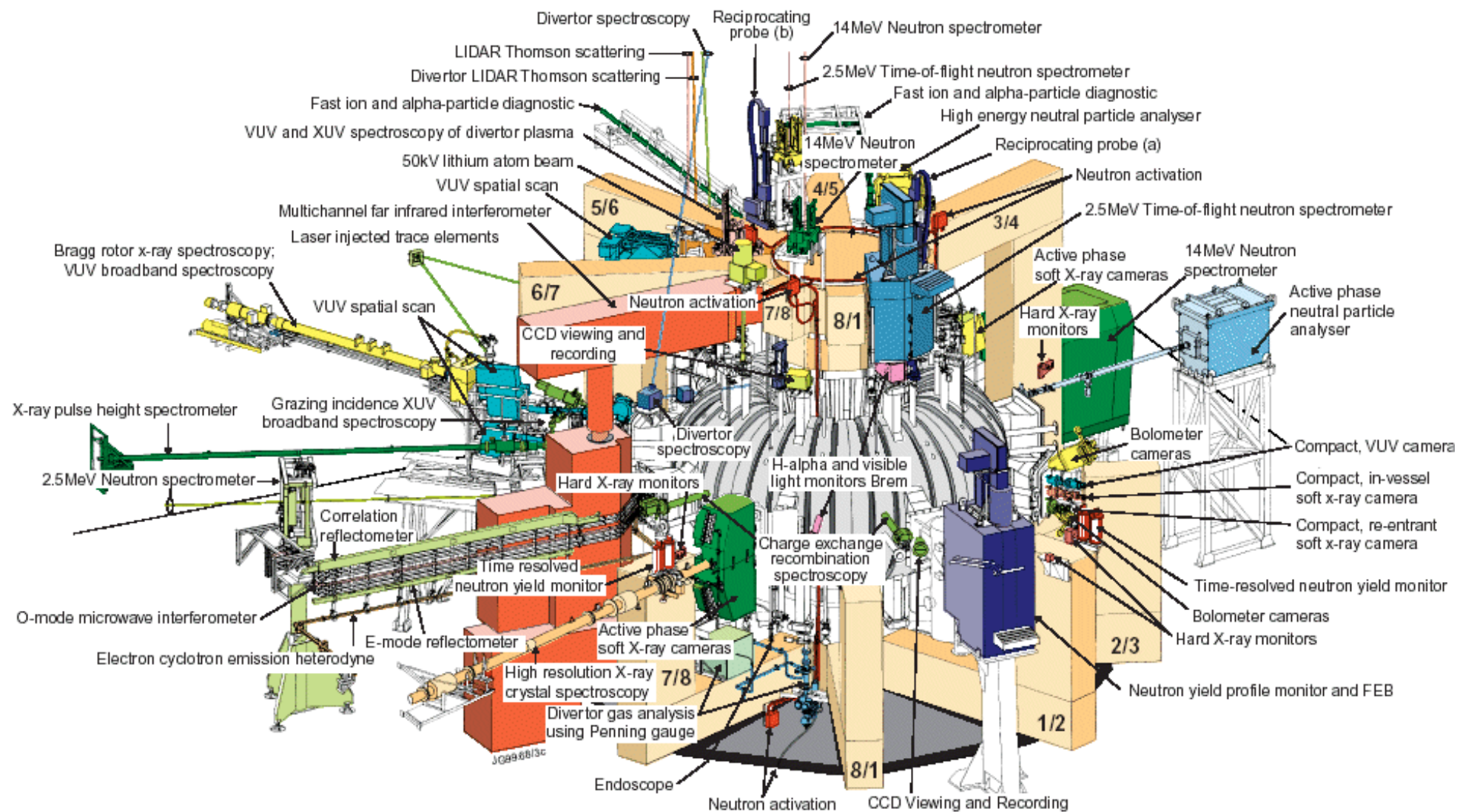
Fusion: inertial confinement vs. magnetic confinement



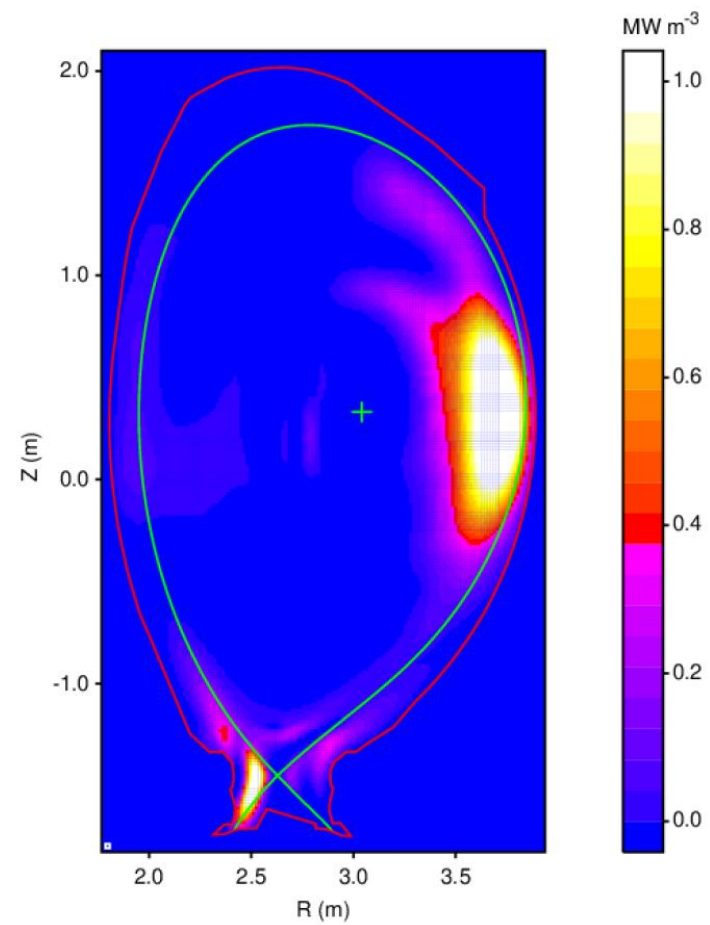
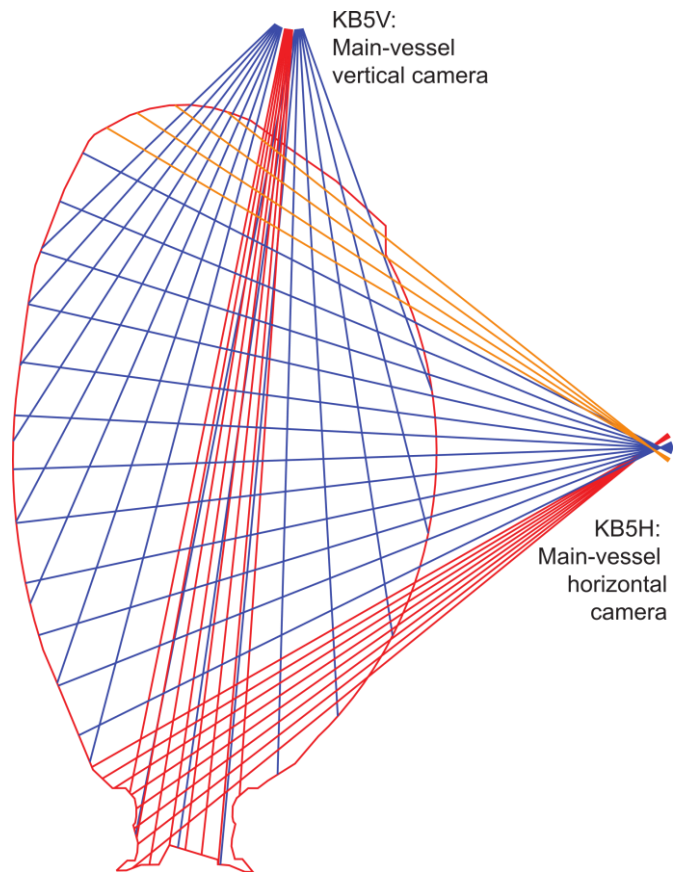
JET: the Joint European Torus



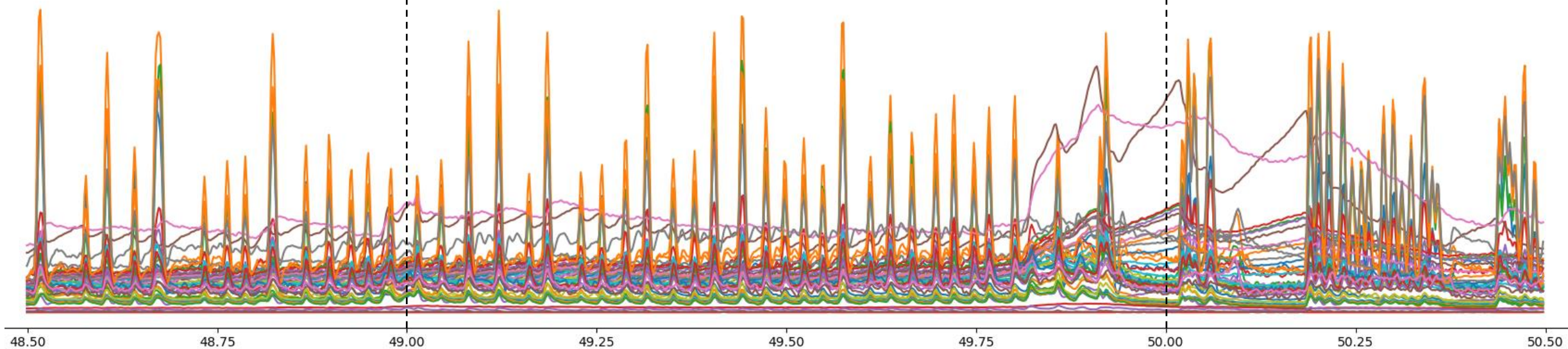
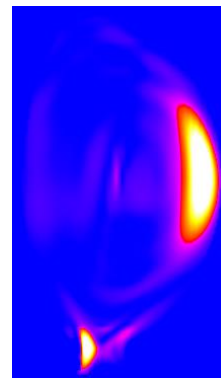
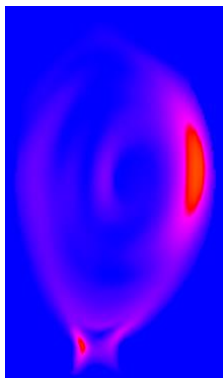
Plasma diagnostics



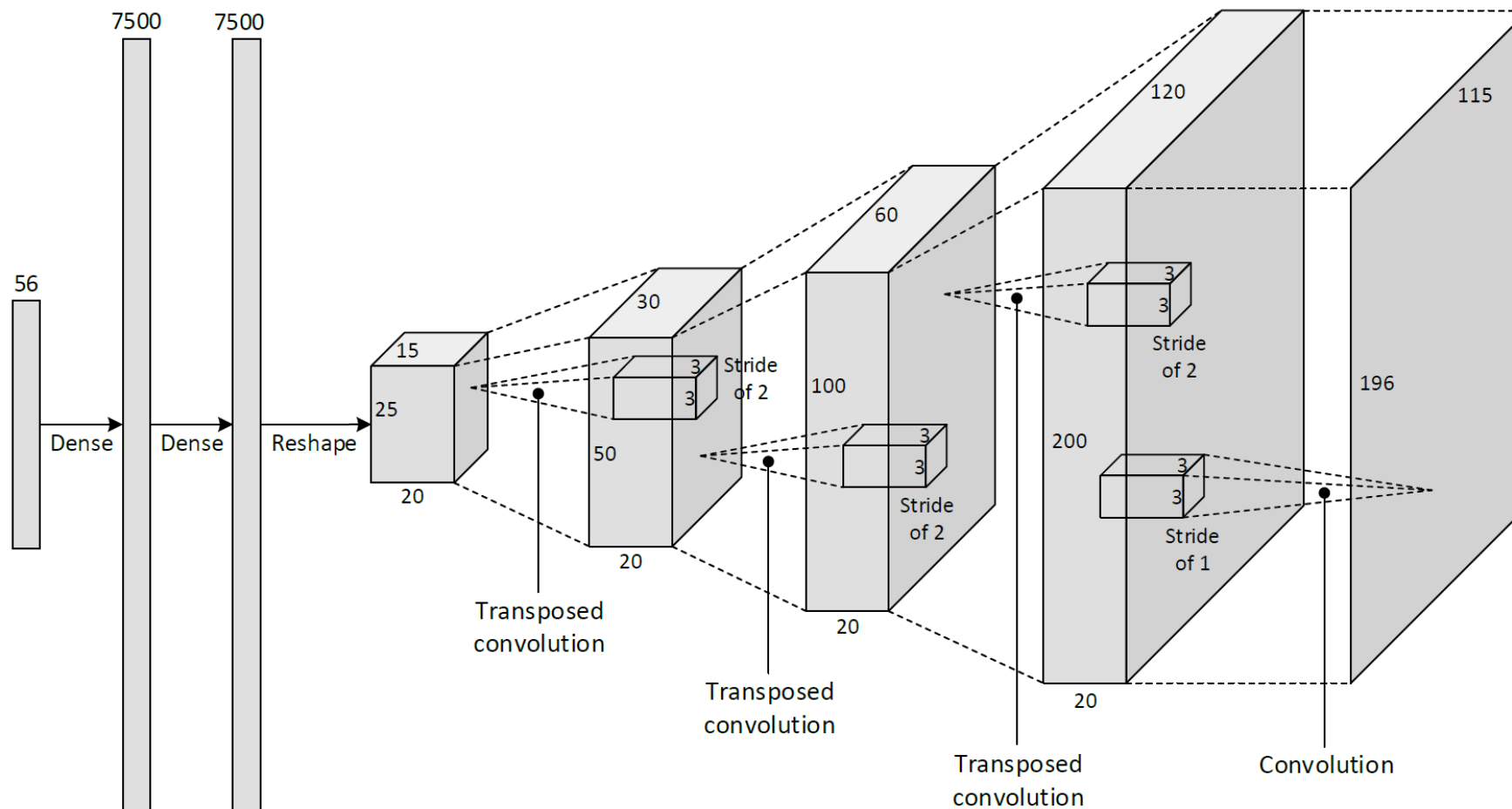
Bolometer tomography at JET



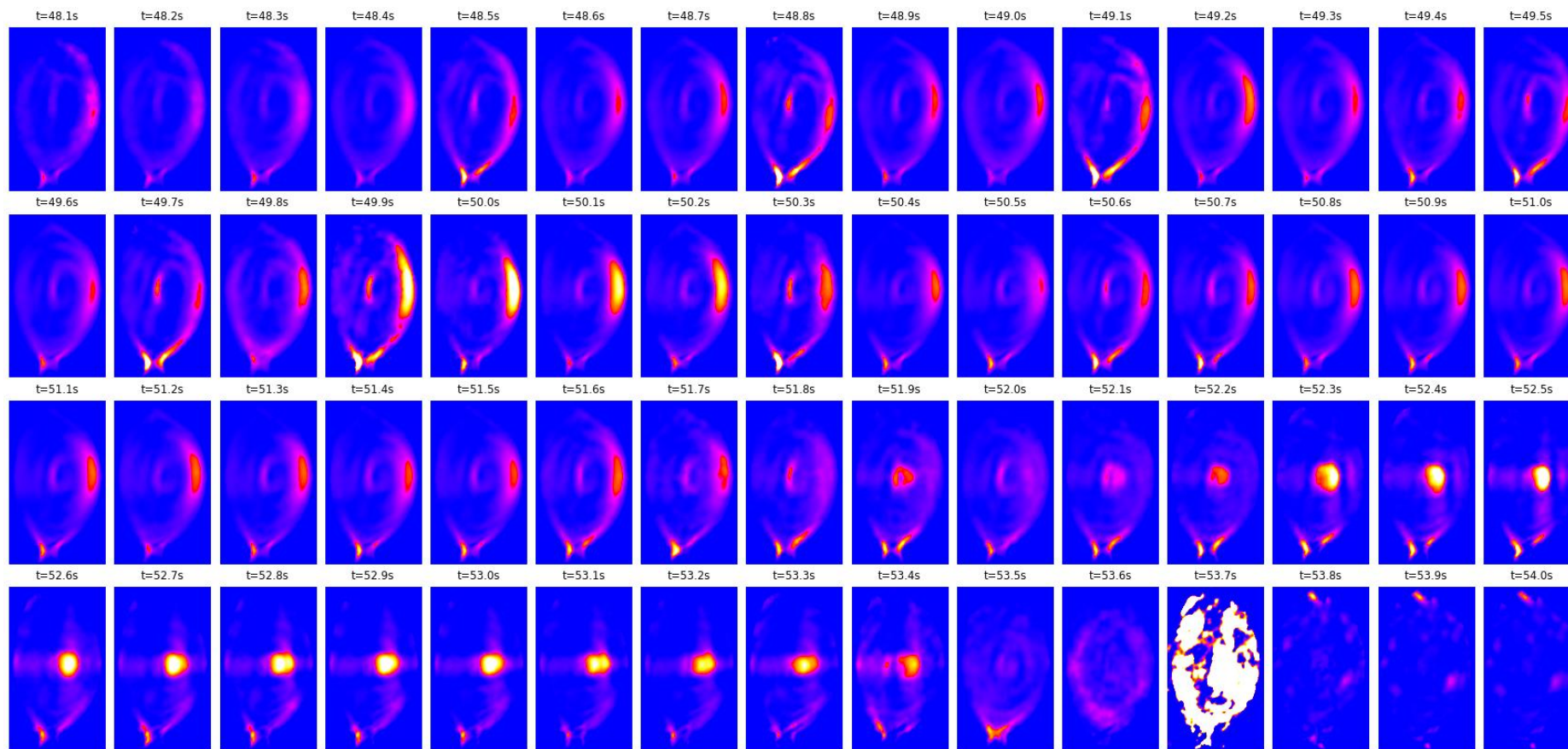
Bolometer tomography at JET



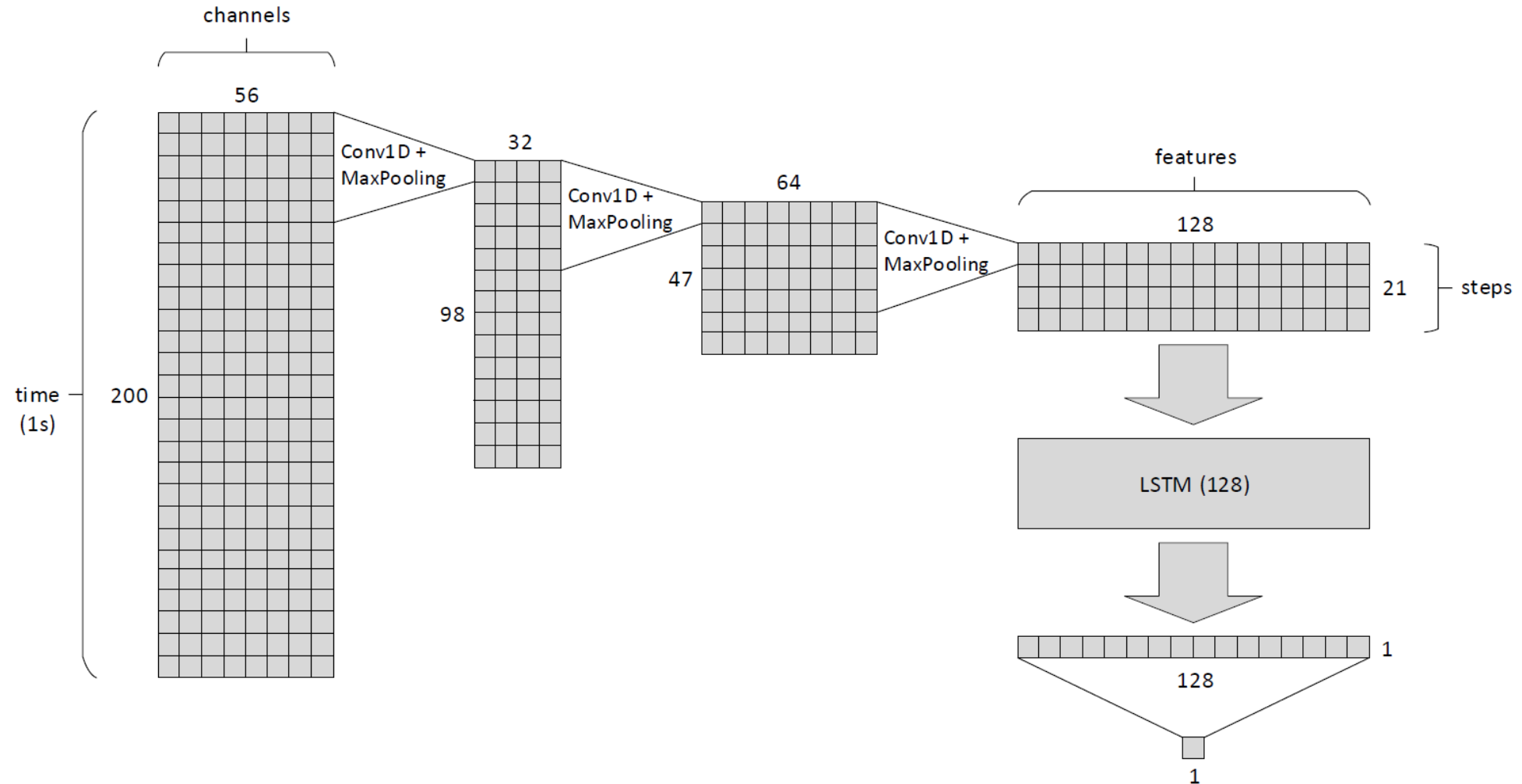
Convolutional neural network for plasma tomography



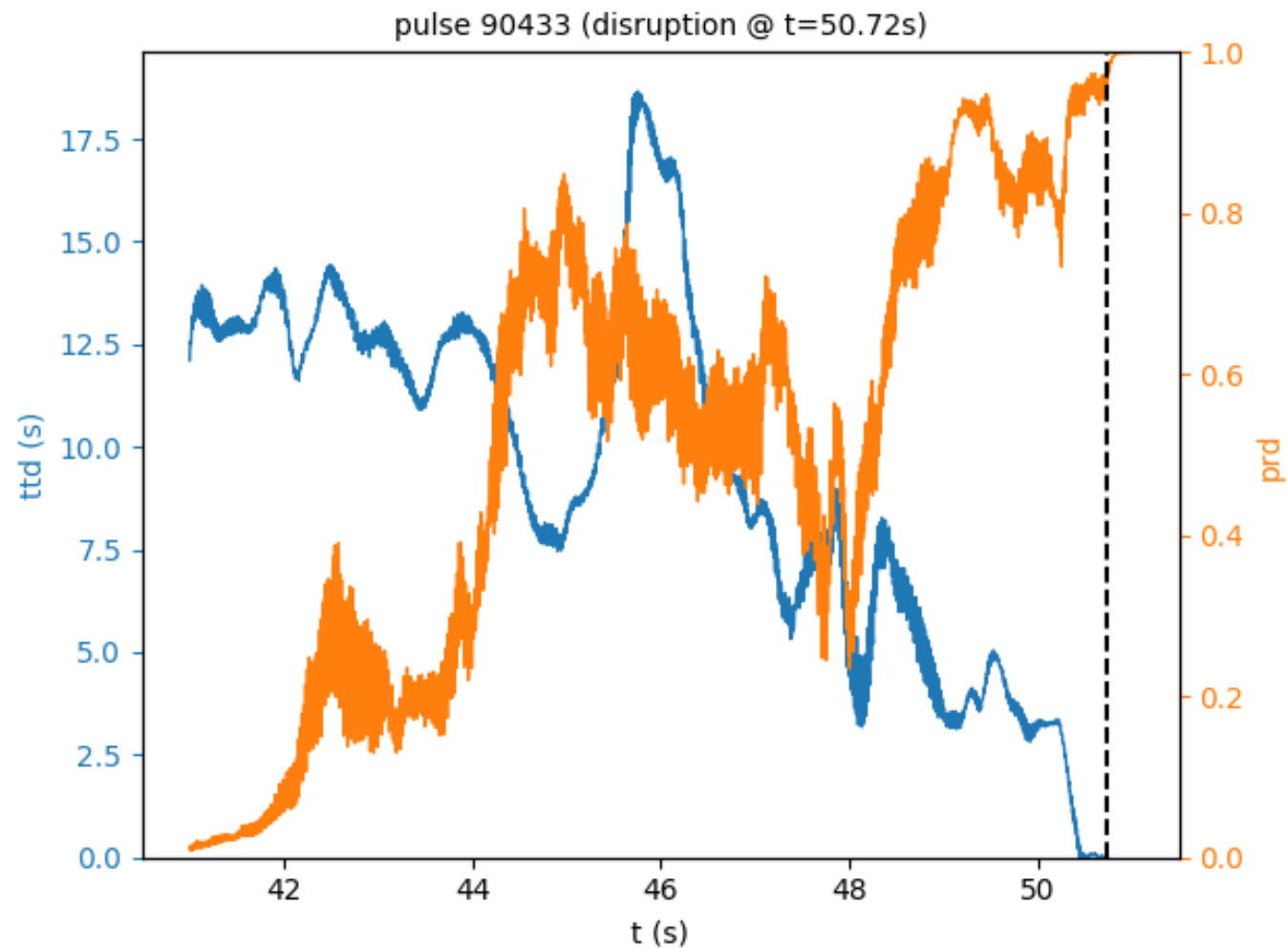
Convolutional neural network for plasma tomography



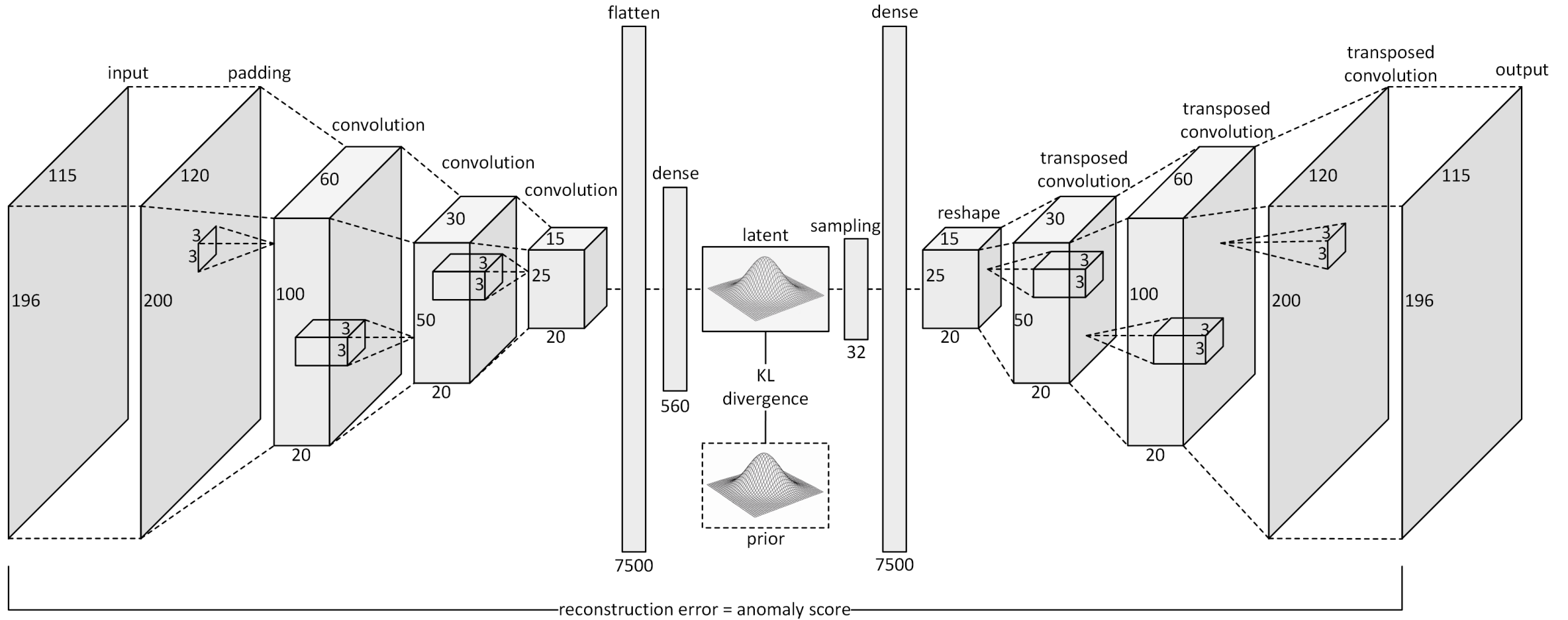
Recurrent neural network for disruption prediction



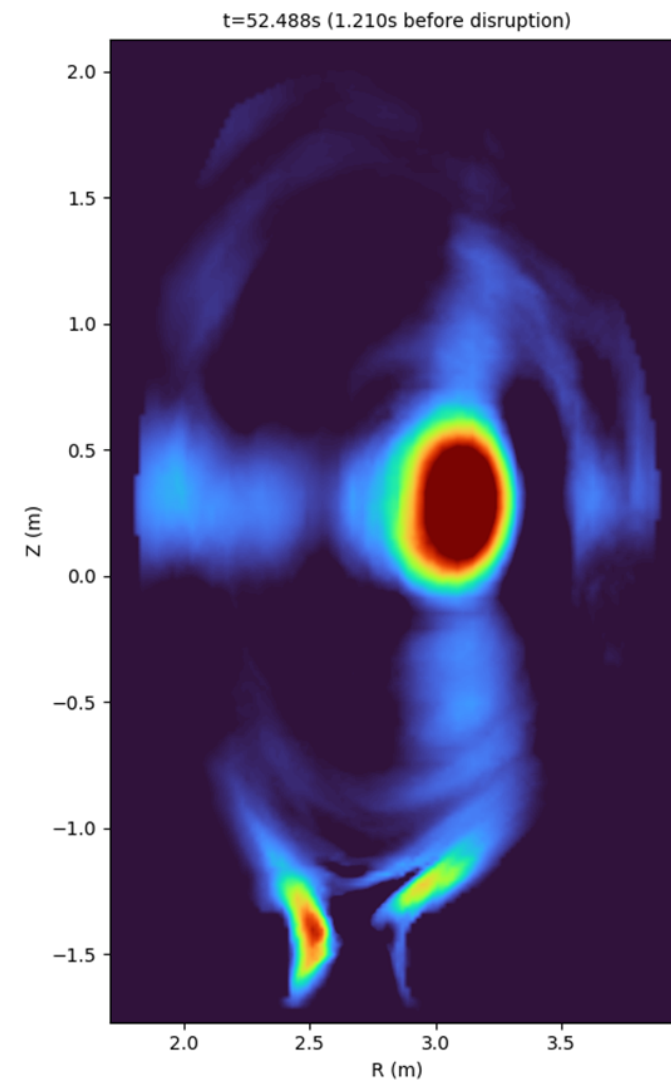
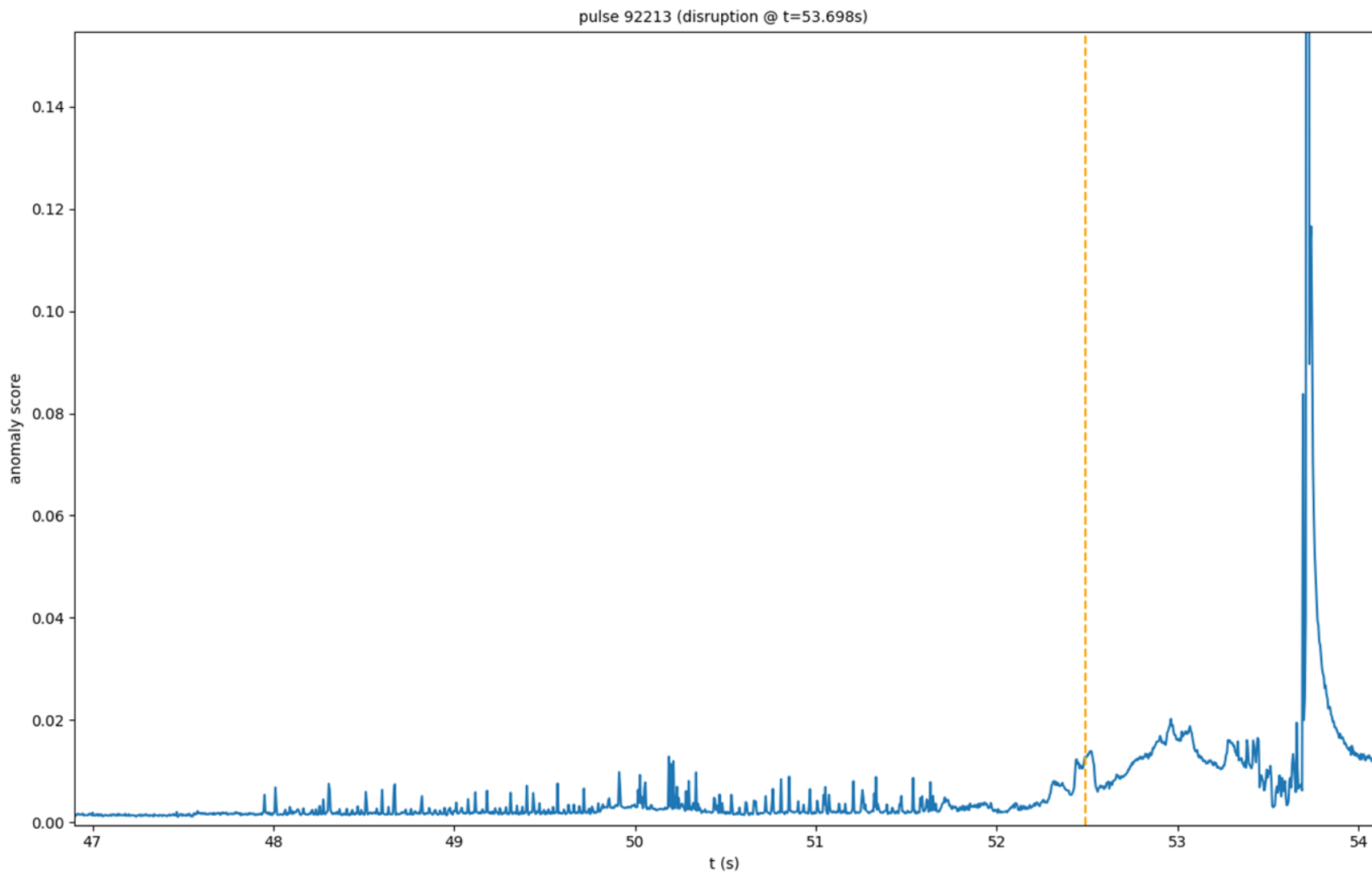
Recurrent neural network for disruption prediction



Variational autoencoder for anomaly detection



Variational autoencoder for anomaly detection



Opportunities

- Data processing and surrogate models
- Disruption prediction and event characterization
- Systematic analysis and knowledge discovery
- Machine design and experiment control

