Experimental benchmarking of models for power plants

- Models exist for describing the SOL plasma, neutrals, impurities, wall interactions and also the pedestal/edge plasma

- Benchmarking these models separately and in combinations on present devices AND ITER
  - How do we do this benchmarking (tokamaks and test stands), *matching scalars, profiles and fluctuations*
  - Diagnostics requirements
  - ITER has driven the urgency of the model development and experimental verification

- Reactor regime provides a different environment, *how different?*

- The reactor environment, or even approaching reactor environment, may make diagnosing edge plasma very difficult, *we have a shrinking window for verification*

- Can we verify the physics simulations in pre-nuclear devices and low fluence environments like ITER, and use the models to extrapolate to the reactor regime
  - *Of course not stupid! No really can we?*
  - We are likely faced with the same situation even with the core plasma

Experimental benchmarking of models for power plants, cont'd

- In the reactor regime:
  - will this regime access a fundamental change in physics (similar to rho* or magnetic Reynolds number in the plasma core)
  - are there other (less fundamental) parameters that will change in this regime (similar to Te/Ti or toroidal rotation in the plasma core)
  - the power plant will access (apart from startup/fractional power operation) the same flattop plasma configuration, it will not produce many flattop conditions
  - moving from physics description to design criteria in a similar vein as ITER tries to do
  - much has been done with modeling to identify edge plasma regimes of operation that are acceptable for ITER, *but techniques to control these regimes seem less well developed*, can we envision the control for the reactor regime, and how to test them
- The primary guideline is to keep the discussion on track toward the modeling of the reactor regime, and how we might move from present devices to ITER and beyond to achieve the necessary benchmarking for this regime.