DEMO REACTOR DESIGN USING THE MODULAR SYSTEM CODE SYCOMORE

- Demonstration fusion reactors (DEMO) are the next step for fusion energy.
- DEMO faces significant integrated design challenges.
- System codes are used to address the impact of the interaction between plant subsystems on the global design.

- SYCOMORE is a new modular flexible system developed within the Integrated Tokamak Modeling framework.
- SYCOMORE contains the following modules: plasma, divertor and SOL, blankets & shields, magnet systems, plant power balance, burn duration.
- The code is coupled to the optimization platform URANIE and uses genetic algorithms to provide optimized designs.

- Pulsed reactor designs are proposed for 500 MW net electric power and 2 hours burn duration (R=9.34m, a=3.02m). Longer durations have a narrow operational space.
- Pulsed designs are sensitive to the way line radiation of seeding impurities are treated.

- Advanced steady-state designs are proposed for 500 MW net electric power. More compact designs (R=8.46m,a=2.66m). Net electric powers higher than 800 MW require significantly larger machines.