SOE 22: Power Grids (joint session SOE/DY)

Time: Friday 9:30–10:00 Location: MA 001

Invited Talk SOE 22.1 Fri 9:30 MA 001

Resilience of power grids against extreme events — •Mehrnaz Anvari — Fraunhofer Institute for Algorithms and Scientific Computing, Sankt Augustin, Germany

Societies are experiencing rapid and pressing changes in the way they generate and consume energy. As part of the necessary transformation towards carbon dioxide neutral energy networks, power systems are increasingly incorporating renewable energy sources (RES) into the energy mix. However, RES such as wind and solar power are inherently uncertain and intermittent, which can result in rapid transitions from maximum power to no power in just a few seconds. These non-Gaussian characteristics, combined with fluctuations in electricity consumption, can create vulnerabilities in the power system. This will be the main topic of the first part of this talk. In addition, to exploit the surplus of RES in other sectors such as transportation and heating, their coupling with power grid will become stronger. This means that failures in the power grid, driven by uncertain RES or extreme weather events can lead to cascading failures not only in the power grid but also in other sectors, creating a domino effect. Therefore, identifying the critical components in the complex power grid whose failures lead to large cascading failures is essential to improve the grid's resilience. In the second part of this talk, the co-evolution method will be introduced as a way of identifying these critical components.