Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Integrated modeling of ASDEX Upgrade plasmas combining core, pedestal and scrape-off layer physics TEOBALDO LUDA DI CORTEMIGLIA, CLEMENTE ANGIONI, MICHAEL DUNNE, EMILIANO FABLE, ARNE KALLENBACH, NICOLA BONANOMI , PHILIP SCHNEIDER, MATTIA SICCINIO, GIOVANNI TARDINI, Max-Planck-Institut for Plasmaphysics, THE ASDEX UPGRADE TEAM, THE EUROFUSION MST1 TEAM — Anew integrated modeling approach has been developed allowing the prediction of the kinetic profiles of tokamak plasmas from magnetic axis to separatrix only using global parameters as inputs. In particular, anew pedestal transport model, based on empirical observations from multiple devices, is included in the ASTRA transport code and applied in combination with the TGLF and NCLASS modules for core turbulent and neoclassical transport. Asimple but realisticscrape-off layer model computesthe separatrix boundary conditions asfunction of the main engineering parameters. In this way, no information fromkinetic profile measurementsis required as input of the integrated modeling workflow, and the only inputs of the model are the magnetic field, the plasma current, the heating power, the fueling rate, and the plasma geometry. The pedestal top pressure is determined using the MISHKA MHD stability code. This model is applied to 50 stationary ASDEX Upgrade H-mode plasmas. Changes inpedestal structure and coregradients, produced by variations in many operational parameters, are well captured by the model. The predicted stored energies are in better agreement with the experimental observations than those obtained bythe IPB98(y,2) scaling law.

Teobaldo Luda di Cortemiglia
Max-Planck-Institut for Plasmaphysics

Date submitted: 29 Jun 2020 Electronic form version 1.4