Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Small, stable plasmas fully decoupled from the PFCs in W7-X.[1] THOMAS SUNN PEDERSEN, Max Planck Institute for Plasma Physics, TAMAS SZEPESI, Wigner Institute, Budapest, Hungary, RALF KOENIG, FELIX REIMOLD, DAIHONG ZHANG, MACIEJ KRYCHOWIAK, ANDREAS DINKLAGE, PETRA KORNEJEW, VICTORA WINTERS, UWE HERGENHAHN, Max Planck Institute for Plasma Physics, TULLIO BARBUI, Princeton Plasma Physics Lab, Princeton, NJ, USA, W7-X TEAM — This presentation focuses on describing and understanding the physics of some unusual discharges in W7-X. One such plasma shrank in minor radius to 0.55 times its original value, triggered by a strong hydrogen gas puff, after having been full-size for several s. The plasma lasted >2 s in a new, stable steady-state with the smaller minor radius – without feedback control - until terminated by the preprogrammed end of ECRH heating. During the phase of reduced size, it had central T_e of ˜2.5 keV, central n_e of 4-6e19 m^{-3} and a confinement time of ˜20 ms, in line with expectations when taking into account the smaller minor radius. The plasma clearly had no direct contact with material objects - all the heating power (3 MW) was dissipated in the clearly visible radiating mantle several cm thick defining the edge of the plasma. These plasmas can be thought of as extreme versions of the power-detached radiating-mantle plasmas seen in W7-X before boronization [1], some of which were visibly smaller than attached plasmas [2]. Thoughts on the stability and potential importance and usefulness of these plasmas will also be presented. [1] D. Zhang et al., Phys. Rev. Letters **123**, 025002 (2019) [2] T. Sunn Pedersen et al., Nuclear Fusion **59** 096014 (2019)

[1]Funded under Euratom grant agreement No 633053, 2014-2020.

Thomas Sunn Pedersen
Max Planck Institute for Plasma Physics

Date submitted: 29 Jun 2020 Electronic form version 1.4