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Theoretical Issues for Plasma Regimes to be Explored by the Ignitor Experiment* A. CARDINALI, ENEA, B. COPPI, MIT, G. SONNINO, Université Libre de Bruxelles — At present, the Ignitor experiment is the only one designed and planned to approach and explore ignition regimes under controlled DT burning conditions. The machine parameters [1] have been established on the basis of existing knowledge of the confinement properties of high density plasmas. A variety of improved confinement regimes are expected to be accessible by means of the available ICRH heating power in addition to the prevalent programmable Ohmic heating power and relying on the injection of high velocity pellets for density profile control. The relevance of the various known confinement regimes to the objectives of Ignitor is discussed. Among other theoretical efforts, a non-linear thermal energy balance equation is investigated to study the onset of thermonuclear instability in the plasmas expected to be produced in Ignitor. The equation for the temperature profile in the equilibrium state is solved with the resulting profiles in agreement with those obtained by a full transport code and commonly adopted scalings for them. The evolution of the thermonuclear instability that relies on the solution of the time dependent energy balance equation is obtained. *Sponsored in part by the U.S. DOE.

[1] B. Coppi, et al. *Nucl. Fus.* **53**, 104013 (2013).

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