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Abstract Submitted
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"Physics of Igniting Plasmas and the Ignitor Approach" A. AIROLDI, C.N.R., B. COPPI, MIT, F. BOMBARDA, E.N.E.A., G. CENACCHI, E.N.E.A. At ignition the nuclear plasma heating equals the rate of plasma energy loss and, at the peak plasma temperatures ($T_{io} \sim 11$ kev) at which high density plasmas ($n_{io} \sim 10^{21}\mathrm{m}^{-3}$) can ignite [1], the thermonuclear instability can develop. A set of nonlinear equations, describing a sequence of plasma temperature increases and crashes due to the additional effect of an instability associated with the plasma pressure gradient, is proposed and analyzed. The starting pressure profile is of the type for which ignition is achieved according to relevant numerical simulations[1]. The considered plasma thermal diffusivity and degree of plasma purity are consistent with those obtained by high magnetic field experiments (most recently by the FTU machine), in which high densities with peaked profiles have been produced by repeated pellet injections. The Ignitor machine [1], that has a major radius $R_o \sim 1.32$m, minor radii $a \times b = 0.47 \times 0.8$ m, and toroidal field $B_{To} \sim 13$ T, is described. The plasma current ($I_p \sim 11$ MA) for which it is designed to operate with ($q_a \simeq 3.6$) corresponds to high values of the poloidal field that are expected to prevent the onset of large scale pressure gradient driven instabilities. *Sponsored mostly by E.NE.A. of Italy and in part by C.N.R. (Italy) and the U.S. D.O.E. [1] B. Coppi, A. Airoldi, F. Bombarda et al, Nucl. Fus. **41**, 1253 (2001).

- [X] Prefer Oral Session
- [ ] Prefer Poster Session

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