Abstract Submitted
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The Ignitor-Columbus Path in Fusion Research[1] MATTEO SALVETTI, BRUNO COPPI, M.I.T. — The Ignitor and Columbus [1] machines are based on the use of normal conducting magnets to produce high magnetic fields and are designed to reach ignition by exploiting the favorable confinement characteristics of high plasma density regimes ($n_0 \cong 10^{21}$ m^{-3}) [2]. The Columbus experiment is proposed as a parallel US project to the Ignitor program carried out in Italy. The possible discovery of new phenomena and the understanding of known ones, i.e. sawtooth oscillations, under fusion burning conditions will drive the design of future fusion reactors. Columbus is designed to reach ignition conditions in D-T plasmas where the α-particles heating compensates for all energy losses and it takes advantage of the Ignitor R&D effort and the technology acquired during the construction of its full size component prototypes. Columbus is geometrically self similar to Ignitor, the dimensions being increased by 25/22 ($R_0 \cong 1.5$ m) and the volume by about 50%. The toroidal magnetic field is decreased by the factor 12.6/13 and the average poloidal field produced by the plasma current is about equal to that of Ignitor for comparable values of the magnetic safety factor (q_a). The reference plasma current is $I_p \cong 12.2$ MA, the value that ITER would produce for the same q_a but without reaching ignition. [1] B. Coppi and M. Salvetti, MIT-RLE report PTP (2003). [2] B. Coppi, MIT-RLE report PTP02/04 (2002), Presentation to the NRC.

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