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The Columbus Concept* M. SALVETTI, MIT, B. COPPI — The Columbus experiment[1] is proposed as a parallel US project to the Ignitor program carried out in Italy. A spectrum of complementary experiments is in fact required for a "Science First" approach to fusion research[2]. 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-particle heating compensates for all energy losses. It takes advantage of the Ignitor R&D effort and the technology acquired during the construction of the full-size prototypes of its main components (the second generation construction of the toroidal field plates has been completed). Columbus is geometrically self-similar to Ignitor, the linear dimensions being multiplied by 25/22 ($R_0 \cong 1.5$ m) and the volume increased 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. The machine is based on cryogenic resistive magnet technologies. *Sponsored in part by the U.S. DOE.

[1]B. Coppi and M. Salvetti, MIT-RLE report PTP(2003)
[2]B. Coppi, MIT-RLE report PTP 02/04 (2002)

Bruno Coppi
coppi@mit.edu
MIT

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