# The Columbus Experiment*

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**Abstract**

The Columbus device is proposed as one component of a spectrum of experiments that are needed to explore the physics of fusion burning plasmas up to ignition. Columbus, which has a larger volume than Ignitor by about 50%, preserves the ability to confine, under macroscopically stable conditions, plasmas with peak pressures exceeding 3 MPa, corresponding to ignition at central plasma densities around $10^{21}$ nuclei/$m^3$ and to reach this regime by ohmic heating alone. A strong ohmic heating is to be maintained so that ignition can be reached even in the case of a failure of the ICRH system. The most important parameter design guideline is the value of the mean poloidal field ($\simeq 3.4T$ ). The plasma current $I_p \simeq 12.2MA$ is close to that of the ITER-Feat concept for the same value of the safety factor $q_{95}(\psi) \simeq 3.6$. As in the case of Ignitor and ITER-Feat, the plasma current redistribution time and the duration time of the plasma burning state are comparable. The Columbus program is proposed as a U.S. counterpart to the Ignitor program conducted in Italy and to be complementary to it. The machine costs and its development can be minimized by incorporating the main engineering solutions devised for Ignitor and taking advantage of the results of the R&D effort that has been carried out already.

[1] B. Coppi and M.F. Salvetti, MIT (RLE) Report PTP 02/06 (December 2002, Cambridge, MA)

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