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Pioneering Structural Solutions for Compact High Field Experiments Developed for the Alcator and the Ignitor Programs[1] M. SALVETTI, B. COPPI, MIT — Recently there has been an increased awareness of the fact that the line of research based on compact high field machines is the most promising to approach ignition conditions in DT burning plasmas and has acquired new perspectives for its applications. Then the technological solutions [1] that have made these machines possible have become subject to new attention and, in some cases, to rediscovery. The Alcator Program and, followed by Ignitor Program, has led to invent the coupled air-core former poloidal field system that has made compact machine possible and has been adopted on all advanced toroidal machines that came after Alcator. A recently rediscovered solution aimed at reducing the mechanical stresses in the inner legs of the toroidal magnet coils is the "Upper and Lower Bracing Rings" system that has had a key role in the design of the Ignitor machine and its evolution. Another solution to minimize the machine dimensions while maintaining high toroidal fields [2], in order to achieve high plasma current densities, is that of "bucking and wedging" of the toroidal magnet by coupling it mechanically to the central solenoid. [1] B. Coppi and M. Salvetti, MIT Report 02/06 (2002). [2] B. Coppi, *Nucl. Fusion* **55**, 053011 (2015).

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