# Feasibility Study of a Compact Ignition Tokamak Based upon GyroBohm Scaling Physics

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**Abstract**

*The design of a compact ($R = 4.45$ m, $B_T = 5.04$ T) ignition tokamak ($Q = \infty$) with superconducting coils using a standard ELMing H–mode plasma appears to be feasible. This effective size ($B_T^{2/3} R^{5/6}$) is smaller than current proposals for $Q = 10$ burning plasma experiments. The good confinement required for ignition with this small effective size is obtained by operating along a gyro-Bohm scaling path starting from the existing tokamak database at high beta ($\beta = 4.1\%$) so that the loss power from core transport exceeds the H–mode threshold power. Using a design that can achieve a high normalized current ($I_p/aB_T = 1.63$) also helps to decrease the size of the machine. The design of the compact ignition tokamak satisfies reasonable engineering constraints on the superconducting toroidal field coils and central solenoid, and allows for a sufficiently long burn time for the plasma current to relax to its final state.*