

ITER-Era Goals for Compact Toroids

✚ **Mission:** Develop a compact magnetic fusion reactor without toroidal field coils

✚ **ITER-Era Goals:**

Demonstrate that a compact toroid (CT) with singly connected vacuum system can achieve stable, sustained plasmas at kilovolt temperatures, with favorable confinement scaling to proceed to a pre-burning CT plasma experiment.

✚ **Description of Goals:**

While both FRC and spheromak have made substantial scientific progress in recent years, they still need to make large gains on both experimental and theory/modeling fronts for them to become viable fusion power sources.

The primary goals for FRC are to demonstrate MHD stability at large s with sufficiently low level of anomalous transport, or provide global stability at lower s , but with even much lower transport. For spheromak, it is essential to demonstrate efficient field buildup that is scalable to reactor conditions, and develop an efficient means for current sustainment compatible with acceptable transport, which is also essential for steady-state FRC development. Improved diagnosis of internal profiles, coupled with simulations, is key to determine optimum CT equilibrium for stability and confinement. Achieving these goals will lead to a new avenue for the development of attractive, economic fusion energy.