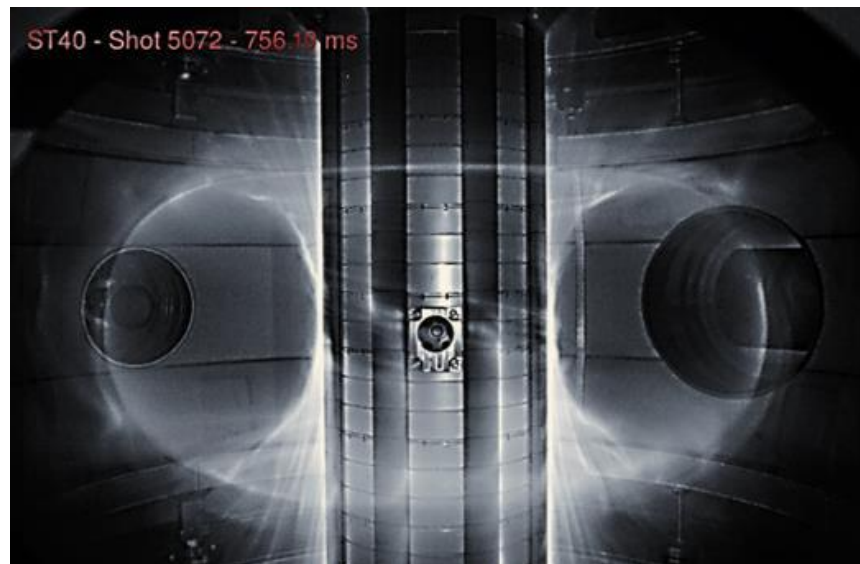


## Can the development of fusion energy be accelerated?

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This talk reviews the unique opportunity of fusion power to deliver safe, carbon-free, abundant, base-load power. The differences from fission power are considered: especially why a Chernobyl, Three Mile Island or Fukushima accident could not happen with a fusion reactor. The Lawson triple product is introduced, along with tokamaks, or magnetic bottles, whose ability to approach close to the fusion burn conditions has so far put them above their competitors. Tokamaks are introduced, and the advantages of spherical tokamaks are listed along with the special engineering challenges that they introduce. Their key advantage is high plasma pressure, and the important  $\beta$  parameter indicating the efficiency of the magnetic field use is introduced. High-temperature superconductors are described along with the opportunities they allow for higher magnetic fields at higher current densities and more modest cryogenic temperatures. The question posed is whether the two developments of spherical tokamaks and high-temperature superconductors could lead to more economical fusion power plants and faster development than the current route through ITER and DEMO.

The talk is based on the introductory paper of the Royal Society Discussion Meeting held in March 2018 whose proceedings are available online at:

<https://royalsocietypublishing.org/toc/rsta/377/2141>