Plasma current generation and ramp-up by the lower hybrid wave using outboard-launch and top-launch antennas on the TST-2 spherical tokamak


**LHW Current Start-up and Sustainment**

Two capacitively-coupled combline (CCC) antennas are installed, and compared. Top-launch schemes with CW TF and CCW TF (corresponding to bottom-launch scheme) show higher plasma current $I_p$ than those by the outboard-launch scheme.

**Pre-ionization by AC Ohmic coil operation**

AC Ohmic coil operation is a reliable pre-ionization tool, which can provides target plasmas for the LHW current start-up, and can replace ECH. A new compact AC Ohmic coil is installed and its performances are compared with those by the original Ohmic coil. There is little difference in the break down loop voltage (non-zero $I_p$), although the shape and the driven AC current are different.