

## Progress of the SUNIST/-2 spherical tokamaks

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The SUNIST spherical tokamak ( $R/a$ : 0.3/0.23 m,  $B_T$ : <0.27 T,  $I_P$ : < 120 kA, first plasma obtained at 2002) has been updated with newly developed plasma diagnostics and plasma actuators in recent two years. A super-fast and highly sensitive multi-channel interferometer was installed, with temporal resolution up to 0.5 microseconds (literally depends only on the sampling frequency of digitizers) and density resolution up to  $1 \times 10^{15} \text{ m}^{-2}$ . These outstanding performances make direct measurements of density perturbations caused by Alfvén eigenmodes possible. A set of thin, high frequency and highly sensitive magnetic probes array fully covering the poloidal cross section was installed. They were able to respond magnetic fluctuations up to 1 MHz and had effective areas around  $238 \text{ cm}^2$ , which mean the array can fulfill the requirement of both equilibrium reconstructions and high frequency MHD studies. Multiple compact supersonic gas injectors were installed inside the vacuum vessel at both high field side and low field side. These injectors were more effective than gas puffing and were used in studying the transport of neutral particles as well as triggering disruptions. A high current density plasma gun was installed as a strong pre-ionizer and an effective current initiation method. Mode conversion from O-mode or X-mode to electron Bernstein mode (B-mode) was observed and measured in ohmic plasmas with electron density 20 times higher than the cut off density of microwaves. A Quasi-Coherence Mode (QCM) observed in the core of Ohmic plasmas in SUNIST by a radial array of electrostatic probes.

The SUNIST-2 spherical tokamak ( $R/a$ : 0.525/0.325 m,  $B_T$ : <1 T,  $I_P$ : < 500 kA) is being assembled (Fig. 1). Power supplies of the magnetic field coils are under test. Basic magnetic diagnostics are designed and being installed. First plasma is expected at the end of this year.

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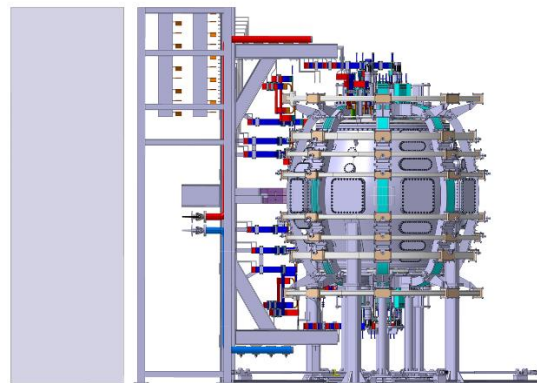


Fig. 1 The side view of the SUNIST-2 spherical tokamak