3D model of the T-15MD TOKAMAK complex [[1]](#footnote-1)\*)

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The design of the diagnostic and the plasma heating systems (NBI, ECRH, ICRH) [1-3] for the T‑15MD tokamak (R = 1.48 m, r = 0.67 m, Bt ≤ 2 T, Ipl ≤ 2 MA) [4] is in progress at NRC "Kurchatov Institute". The diagnostic system includes optical diagnostics (CXRS, Thomson scattering diagnostics) [5, 6], electromagnetic diagnostics (magnetic probes, Rogowski coil, diamagnetic loops) [7-9], microwave diagnostics [10] and dual heavy ion beam plasma diagnostics [11].

The plasma heating system, the power supply and water cooling lines of the device and other technological systems essential for the tokamak operation are located in the T-15MD hall. It considerably limits the available space for plasma diagnostics layout. At the stage of the diagnostic system design, it is critical to consider the size, placement and technical features of various systems. A three dimensional model of the tokamak and its hall has been created for optimal placement of the equipment, taking into account all the constraints and safety requirements. The model makes possible to ensure the coordinated placement of the necessary equipment around the T‑15MD, the installation of technical networks, as well as to realistically assess the possibility of subsequent commissioning and maintenance of this equipment and to facilitate the design of new elements. Cross-system processes such as the "cutting" manufacturing of tokamak flanges or the design of common electrical and water networks of several diagnostics can also be optimized using a joint three-dimensional model.

Currently, the model includes the tokamak T-15MD, the basement and the ground floor of the installation hall, the diagnostic mezzanine, neutral beam injectors, ECRH waveguides, reflectometry equipment, diagnostic neutral beam injector, dual heavy ion beam probe diagnostic, ECE diagnostics, Thomson scattering diagnostics and laser interferometer. In the process of creating the model, data from the technical documentation, the actual position of the objects and the design parameters of the systems were taken into account.

In the near future, it is planned to include in the model heating neutral beam injectors and gyrotron power supply, expand the number of included diagnostics and refine the basement models.

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