INFRASTRUCTURAL HARDWARE PLATFORM OF THE COMMON IT SPACE FOR FUSION RESEARCH (FUSIONSPACE) [[1]](#footnote-1)\*)

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With the growing complexity of scientific research and increasement of experimental data, the need of networking in the field of fusion science is rising. Information technologies can help fusion society to join competencies, combine processing power and hardware infrastructure, and also organize the training of researchers on the basis of existing experimental programs. The technological basis for scientific networking is the remote participation platforms.

Since 2021 infrastructural hardware platform of the common IT space for fusion research (FusionSpace) has been deployed in Russia to provide the opportunity of remote participation in national fusion experiments. FusionSpace provides access to scientific and experimental data, thematic studies, memo items, and other information, assists in scientific and professional communication, performs joint experiments on national fusion facilities for the main actors in Russian fusion research. FusionSpace is represented by the set of nodes: Joint laboratories (data sources – fusion facilities and installations – connected via unified interface to common network), Central node (servers, performing calculations and ensuring the functioning of the FusionSpace services, etc.) and Remote participation centers (a set of workstations providing collective access to FusionSpace capabilities).

ITER, the world’s biggest fusion experimental machine, will start its operation in 2025. ITER IT environment will become a standard for international interaction and cooperation within the framework of fusion research; therefore, Russia should be ready to work with ITER machine and its IT standards.

The report considers the Russian experience in FusionSpace designing and prototyping, the first results of its functioning. The report also describes the largest international fusion projects on remote experiment participation, especially practices applied in ITER Organization. Based on the analysis of the foreign experience and approaches used in the ITER Organization, forward-looking lines of FusionSpace development were defined. These principles will help to create a common IT space of the Russian fusion research and ensure the integration with international research programs. The report suggests development of unified formats and data structures, compatible with IMAS; storing data in both unified and native formats; integration with mathematical software and codes with the ability to create custom applications, etc.

This report aims to demonstrate the ability of FusionSpace platform enhancement as a domestic and international fusion research integration tool considering the best practices, standards and approaches used worldwide, including the ITER Organization.

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1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/XLIX/E/ru/IE-Portone.docx) [↑](#footnote-ref-1)