Scientists create method to obtain the most precise data for thermonuclear reactors

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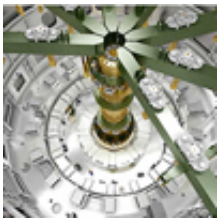

Credit: National Research Nuclear University

Researchers from the National Research Nuclear University, working as part of an IAEA project, have created the most accurate method to date of obtaining the data needed to reliably operate a thermonuclear reactor. The results were published in the *Journal of Nuclear Materials*.

Thermonuclear facilities attempt to generate electricity using thermonuclear fusion reactions like those that drive the sun. The largest thermonuclear fusion project is ITER, which is currently under construction in France.

Constructing thermonuclear reactors poses a number of challenges. For example, choosing the material for the most energetically tense reactor elements, which are in contact with thermonuclear plasma, is difficult. Tungsten is a material of interest, though specialists are still unsure how this metal will behave in the conditions of a working fusion reactor. In particular, researchers are interested in tungsten's interaction with one of

the components of thermonuclear fuel, the radioactive hydrogen isotope tritium. One potential problem is defects of plasma-facing reactor walls caused by tritium radiation.

Tritium accumulation is a threat for several reasons, explains MEPhI Plasma Physics Department researcher Yury Gasparian. He claims that tritium in large quantities can lead to the complete degradation of reactor walls' mechanical properties. An uncontrolled leak of the accumulated tritium from the walls' material leads to so-called plasma disruption and large energy emission, says Gasparian.

To find solutions to such problems, it is necessary to know the value of hydrogen interaction energy with defects of metal of thermonuclear facility walls. Employees of the MEPhI Plasma Physics Department have created a new method to measure this parameter.

According to Gasparian, this method, unlike those used before, obtains the most precise data out of many possible values. Moreover, it is insensitive or low sensitive to the factors that previously influenced the results of the measuring.

Provided by National Research Nuclear University

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