Contribution ID: **1907** Contribution code: **TUPS137** Type: **Poster Presentation**

The application of laser-irradiated pyroelectric crystals in neutron generators

Tuesday 3 June 2025 16:00 (2 hours)

Pyroelectric neutron generators have been one of the research hotspots in the field of neutron generation due to their advantages of compact structure and controllable intensity. A novel laser pyroelectric neutron generator was proposed by utilizing 1064nm wavelength pulsed laser irradiation on LiTaO3-Mo-TiDx for simultaneous heating and ionization. The laser irradiation on the pyroelectric crystal to generate high voltage potential, then focusing the laser to ionize TiDx to produce deuterium ions. Under the influence of an electric field, these deuterium ions bombard the surrounding titanium deuteride annular target to induce deuterium-deuterium nuclear reactions for neutron production. Experimental comparisons of crystal temperature change rates and surface temperature distributions under the action of pulsed laser and continuous laser are conducted. Finally, combined with COMSOL simulation results, the correlation between temperature changes and the maximum potential and acceleration gap electric field distribution is established. This study explores the main influencing factors of the maximum potential and electric field distribution in laser pyroelectric neutron generators.

Footnotes

Paper preparation format

Word

Region represented

Asia

Funding Agency

The work is supported by the National Natural Science Foundation of China (Grant No. 12175319, 12475170), Guangdong Basic and Applied Basic Research Foundation (Grant No. 2022B1515120027, 2024A151501.

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Session Classification: Tuesday Poster Session

Track Classification: MC3: Novel Particle Sources and Acceleration Techniques: MC3.T28 Neutron Sources