Contribution ID: **57** Type: **not specified**

Study on a Gas Target Deuterium-Tritium Fusion Neutron Source

With the continuous development of neutron sources in various fields, achieving efficient miniaturization of accelerator-based neutron sources has become a research hotspot. Traditional large-scale neutron sources devices are limited by their large size and high energy consumption, restricting their feasibility in small laboratories and field applications. Therefore, designing a compact and neutron source with low-energy consumption holds significant scientific and practical value. This research proposes a novel design for a deuterium-tritium (D-T) neutron source, which employs a ring-shaped gas target structure combined with 16 uniformly arranged deuteron beams to enhance neutron yield and uniformity in energy distribution. Neutron field data were extensively simulated using the Geant4 Monte Carlo program. The results show that, under a unit milliampere beam current, the neutron yield at the center of the ring target reaches the order of 10ˆ14 neutrons per second, with good monoenergetic characteristics and a relatively concentrated energy distribution, indicating potential as a quasi-monoenergetic neutron source. Additionally, the angular distribution of the neutron field inside the ring target is stable with minor fluctuations, demonstrating good spatial uniformity. Furthermore, to reduce tritium gas consumption, two design schemes are proposed to optimize gas usage efficiency. This design provides a new approach to the miniaturization and efficiency improvement of accelerator-based neutron sources.

Primary author: JIANG, Qiaoyue (Lanzhou University)

Co-authors: YAO, Zeen (Lanzhou University); WEI, Zheng (Lanzhou University); ZHANG, Yu (Lanzhou University); WANG, Junrun (Lanzhou University); WU, Kang (Lanzhou University)

Presenter: JIANG, Qiaoyue (Lanzhou University)

Session Classification: Poster Session

Track Classification: Poster session