

(α ,n) cross section needs for fusion

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Monitoring and measurement of alpha particles produced in fusion deuterium-plasmas is an important requirement for the successful development of fusion power plants. The loss of fast (3.5 MeV) α -particles from the plasma is problematic; if too many escape without transferring their energy back into the plasma, then a self-sustaining system might not be achievable. During the development and testing of plasma operational scenarios, it is vital to have accurate measurement of the flux of fast- α losses.

Real-time measurement approaches based on liquid-scintillation are being developed, but these have uncertain tolerance to the harsh radiation fields in fusion reactors and, besides, also need characterisation. Robust measurements based on activation-foils are an obvious alternative and complementary technique. However, such an approach requires identification of suitable diagnostic foils with well-known, low uncertainty cross sections at 3.5 MeV. Most of the data is deficient (absent) at this energy, highlighting an urgent need to perform new measurements for relevant candidate materials.

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