# Seminar

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# Institute for Plasma Research

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**Title:** Estimation of tritium losses generated in D-T reaction through 14 MeV Neutron Generator using SDTrimSP Simulations and applicability in other fusion technology areas

**Speaker:** Dr. Varun Vijay Savadi
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**Date:** 05th August 2024 (Monday)

**Time:** 03:30 PM

**Venue:** Seminar Hall, IPR

**Abstract**

SDTrimSP a Binary Collision Approximation (BCA) simulation tool, is primarily employed to investigate surface interactions involving ions and atoms. These simulations play a crucial role in fusion technology research. For instance, plasma-facing materials like tungsten degrade due to interactions with ions and neutron irradiation, impacting reactor lifetime and maintenance. The current study focuses on observing various methods of deuterium beam interaction with a tritium titride target. At the 14 MeV neutron generator facility based at the Institute of Plasma Research in Gandhinagar, the yield is $10^{12}$ neutrons per second. The 300 keV deuterium beam, obtained through acceleration, interacts with the target via the D-T reaction, leading to processes such as ion exchange, outgassing, sputtering, and diffusion. Efficient utilization of the target involves maximizing ion exchange interactions over other phenomena. SDTrimSP simulations investigate tritium removal resulting from irradiating deuterium ions at different beam energies (ranging from 100 to 650 keV). The maximum depth penetration of the 300 keV deuterium beam into the target is approximately 2-2.5 μm, out of a total target thickness of up to 4.5 μm. To validate simulation results, experimental studies will vary beam current and energies (100-200 keV). For future research, we will investigate tritium losses resulting from heat dissipation, temperature variations, fluctuating beam currents, and their impact on the multi-layered target. The results obtained from these simulations will provide essential insights for optimizing tritium losses, contributing to a better understanding of the overall target lifecycle.