# Seminar

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# Institute for Plasma Research

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**Title:** Cross section measurements for Strontium isotopes using D-T neutrons with Covariance analysis and time of flight experiment for neutron energy measurement

**Speaker:** Dr. Vibhutiben R. Vashi
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**Date:** 6th January, 2026 (Tuesday)

**Time:** 10:00 AM

**Venue:** Seminar Hall, IPR

## Abstract

The isotopes of strontium radionuclide are utilized in nuclear medicine for diagnostic imaging. The cross-section for $^{86}Sr(n, 2n)^{85m}Sr$, $^{88}Sr(n, 2n)^{87m}Sr$, $^{88}Sr(n, \alpha)^{85m}Kr$, and $^{88}Sr(n, p)^{88}Rb$ reactions have been measured using the neutron activation method followed by off-line gamma ray spectroscopy at 14.96 MeV of neutron energy in the present study. The energy of neutrons was calculated using kinematic equation. The irradiation experiment was conducted using a 14 MeV neutron generator at the Neutron and Ion Irradiation Facility (NIIF), Institute for Plasma Research, Gandhinagar, Gujarat, India. The neutrons are generated using a D-T fusion reactions. The $^{27}Al(n, \alpha)^{24}Na$ reaction is used as a flux monitor reaction to measure the neutron flux incident on the sample. Theoretical calculations were performed using the statistical nuclear model codes TALYS-2.0 and EMPIRE-3.2.3. Further, the TASMAN code was utilized to calculate the covariance and sensitivity of the reaction. The experimentally measured reaction cross section is compared with the previously published nuclear data from the EXFOR database, the data extracted from the evaluated data libraries where accessible, and the theoretical predictions. The detailed covariance analysis for the reactions is also included in the present study.

A comprehensive literature survey was performed on time-of-flight experimental setups aimed at studying fast neutron events and measuring the kinetic energy of neutrons.

**References**

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N. Otuka *et al.*, Nucl. Data Sheets **120**, 272 (2014).

A. Koning, S. Hilaire, and S. Goriely, TALYS-1.95 - A Nuclear Reaction Program, User Manual, 1st ed. (NRG, Petten, 2017).

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