# Absolute measurements of 14 MeV neutrons with diamond detectors

L. G. Tedoldi[1], D. Rigamonti[2], C. Cazzaniga[3], S. Cancelli[4], A. Dal Molin[2], M. H. Kushoro[1,2], G. Marcer[2], M. Rebai[2], E. Perelli Cippo[2], M. Tardocchi[2]

[1]*Department of Physics, University of Milano-Bicocca, Milan, Italy*
[2]*Institute for Plasma Science and Technology, National Research Council of Italy, Milan, Italy*
[3]*UKRI-STFC, Rutherford Appleton Laboratory, Didcot, OX11 0QX, United Kingdom*
[4]*Fondazione Bruno Kessler, Trento, Italy*

Corresponding Author Email: l.tedoldi1@campus.unimib.it

Neutron measurements are of crucial importance for the forthcoming DT fusion reactors as they allow to measure the fusion power, which is a primary parameter to evaluate the fusion performance.

The standard method for fusion power measurement is based on counting neutrons with fission chambers cross-calibrated with activation foils. This method requires complex Monte Carlo simulations benchmarked with in-vessel calibration measurements. The capacity of performing absolute neutron measurements allows to overcome these necessities.

In this work a diamond detector is studied to obtain absolute measurements of 14 MeV neutrons produced by the DT reactions. The detector was studied first at the Frascati Neutron Generator (FNG) in Frascati, Italy, where the absolute neutron flux is well known, in order to obtain the detector efficiency. The measurements were then repeated at the Neutron Irradiation Laboratory for Electronics (NILE) facility at the Rutherford Appleton Laboratory (RAL) in the UK to verify the efficiency obtained previously. The measurements of the neutron flux are taken simultaneously with several activation foils and a metrology calibrated diamond detector in order to confirm the results.