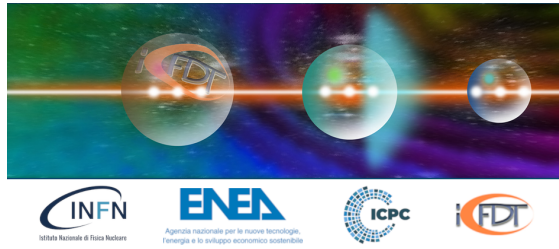


ICFDT7 - 7th International Conference on Frontier in Diagnostic Technologies



Contribution ID: 35

Type: **Tutorial**

Nuclear Spectroscopy on Fusion Reactors

Monday, 21 October 2024 10:00 (30 minutes)

Historically, nuclear measurements have played a primary role in nuclear fusion experiments, such as those conducted on tokamaks. The notable example is given by the measurement of the neutron counts which provides the direct estimation of the fusion power. This is an essential parameter to know, in particular for the forthcoming DT fusion reactors.

The advent of neutron and gamma ray spectroscopy, which is the measurement of their energy spectra along collimated lines of sight, opened up to new diagnostic opportunities allowing to assess the fuel ions distribution functions and the effectiveness of the external heating systems. In this contest, the recent DT experimental campaigns of the Joint European Torus provided a unique opportunity to evaluate the performance of the nuclear diagnostics suite which has been recently upgraded within the EUROfusion Enhancement program. This talk will present the state of the art of nuclear spectroscopy diagnostics and their exploitation on DT fusion reactors, drawing on the experience gained from JET. Examples of instruments developed for ITER and SPARC will be presented. Additionally, an alternative method for assessing the fusion power based on the spectroscopy measurement of the 17 MeV gamma rays emitted by the weak ($\approx 10^{-5}$) DT reaction channel will also be discussed.

Primary author: RIGAMONTI, Davide (CNR-ISTP)

Co-authors: Mr CELORA, Agostino (Department of Physics, University of Milano-Bicocca, Milan, Italy); DAL MOLIN, Andrea; MURARO, Andrea (IFST-CNR); PERELLI CIPPO, Enrico (Istituto Nazionale di Fisica Nucleare); Mr CARUGGI, Federico (Department of Physics, University of Milano-Bicocca, Milan, Italy); Mr SCIOSCIOLI, Federico (Department of Physics, University of Milano-Bicocca, Milan, Italy); CAMERA, Franco (Istituto Nazionale di Fisica Nucleare); CROCI, Gabriele; Mr GUARINO, Gaetano (Department of Physics, University of Milano-Bicocca, Milan, Italy); Dr GROSSO, Giovanni (CNR-ISTP); Dr MARCER, Giulia (Department of Physics, University of Milano-Bicocca, Milan, Italy); GORINI, Giuseppe (Università degli Studi di Milano-Bicocca); Dr SCIONTI, Jimmy (CNR-ISTP); Ms TEDOLDI, Letizia Giulietta (Department of Physics, University of Milano-Bicocca, Milan, Italy); Mr DALLA ROSA, Marco (Department of Physics, University of Milano-Bicocca, Milan, Italy); Dr TARDOCCHI, Marco (CNR-ISTP); REBAI, Marica (MIB); PILLON, Mario; NOCENTE, Massimo (Istituto Nazionale di Fisica Nucleare); KUSHORO, Matteo Hakeem (Istituto Nazionale di Fisica Nucleare); SALEH, Miriam; PUTIGNANO, Oscar (Istituto Nazionale di Fisica Nucleare); Mr COLOMBI, Stefano (Department of Physics, University of Milano-Bicocca, Milan, Italy); Dr CANCELLI, Stephanie (Department of Physics, University of Milano-Bicocca, Milan, Italy); Dr GHANI, Zamir (UKAEA)

Presenter: RIGAMONTI, Davide (CNR-ISTP)

Session Classification: Fusion Products

Track Classification: Fusion Products