



Contribution ID: 75

Type: Short Talk

New insights on the $D(T,5He)\gamma$ reaction and prospects for D-T fusion power measurements on ITER

Monday, 21 October 2024 11:20 (10 minutes)

Besides the well known emission of a 14 MeV neutron and a 3.5 MeV alpha particle, the D-T fusion reaction may also evolve with a secondary branch in which a 17 MeV gamma-ray is emitted together with a $5He$ nucleus. The physical properties of this secondary branch, though, were poorly known because of its very low probability to occur of about 10^{-5} .

The second and third D-T experimental campaigns at the Joint European Torus allowed to investigate this radiative branch for the first time in a magnetic confined plasma, revealing unpredicted informations about its energetic distribution and occurrence rate with unparalleled accuracy [1-2]. For this purpose, a single line-of-sight LaBr₃-based gamma-ray spectrometer was employed and an absolute counting of these fusion gamma-rays was performed.

These accurate determinations pave the way for a direct and neutron-independent measurement of the fusion power in magnetic confinement fusion reactors, based on the absolute counting of D-T gamma-rays.

In particular, the development of a gamma-ray spectrometer for fusion-power measurements is currently under investigation for ITER, promising to provide measurements with 1 s time resolution and less than 10% uncertainty for fusion powers in the [3 MW – 500 MW] range.

Primary author: MARCER, Giulia (University of Milano-Bicocca)

Co-authors: DAL MOLIN, Andrea; Dr KOVALEV, Andrei (Iter Organization); Dr CORITON, Bruno (Iter Organization); RIGAMONTI, Davide (CNR-ISTP); Dr PANONTIN, Enrico (Massachusetts Institute of Technology); Dr PERELLI CIPPO, Enrico (Istituto per la Scienza e Tecnologie dei Plasmi); SCIOSCIOLI, Federico (Department of Physics, University of Milano-Bicocca, Milan, Italy); Dr CROCI, Gabriele (University of Milano-Bicocca); GORINI, Giuseppe (Universita' degli Studi di Milano-Bicocca); SCIONTI, Jimmy (CNR-ISTP); DALLA ROSA, Marco (Department of Physics, University of Milano-Bicocca, Milan, Italy); TARDOCCHI, Marco (CNR-ISTP); REBAI, Marica (Istituto per la Scienza e Tecnologie dei Plasmi); Dr NOCENTE, Massimo (University of Milano-Bicocca); PUTIGNANO, Oscar (Istituto Nazionale di Fisica Nucleare); COLOMBI, Stefano

Presenter: MARCER, Giulia (University of Milano-Bicocca)

Session Classification: Fusion Products

Track Classification: Fusion Products