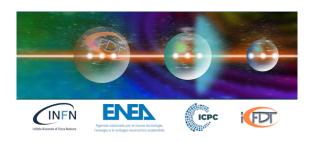
## ICFDT7 - 7th International Conference on Frontier in Diagnostic Technologies



Contribution ID: 75 Type: Short Talk

## New insights on the D(T,5He)y 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.

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**Session Classification:** Fusion Products

Track Classification: Fusion Products