The new annular double-sided silicon detector dedicated to light particles' discrimination at n_TOF/CERN

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Studies of (n, cp) reactions are important for a variety of fields, such as Nuclear Astrophysics, Nuclear Medicine (dosimetry, neutron therapy, radioisotope production), and nuclear energy applications. Specifically, concerning fusion reactor technology a large set of neutron data are urgently needed for the design, construction, and safe operation.

Accordingly, towards the development of innovative detection systems that could address these needs, within this contribution, the proposed validation of a new annular neutron-Transmutation Doped (nTD) double-sided silicon detector (DSSD) [1] will be presented. The most important characteristics will be given along with the expected performance and abilities within the n_TOF facility at CERN. Furthermore, the adopted particle identification technique based on pulse shape discrimination [2] will be outlined. Finally, some preliminary experimental results will be discussed.

[1] L. Consentino et al., Measurement of (n, cp) reactions in EAR1 and EAR2 for characterization and validation of new detection systems and techniques CERN-INTC-2022-019 / INTC-P-629
[2] M. Assie' et al., Characterization of light particles (Z≤2) discrimination performances by pulse shape analysis techniques with high-granularity silicon detector, Eur. Phys. J. A 51, 11 (2015)