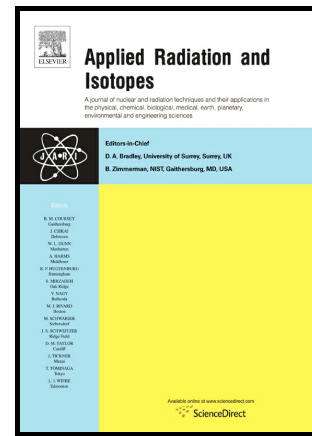


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R. Bedogni, J.M. Gómez-Ros, A. Pola, M. Treccani, M. Costa



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## CYSP-HS: a new version of the CYSP directional neutron spectrometer with increased sensitivity

R. Bedogni<sup>1\*</sup>, J.M. Gómez-Ros<sup>1,2</sup>, A. Pola<sup>3,4</sup>, M. Treccani<sup>1,5</sup>, M. Costa<sup>6,7</sup>

<sup>1</sup>INFN – LNF, via E. Fermi n. 40, 00044 Frascati (Roma), Italy

<sup>2</sup>CIEMAT, Av. Complutense 40, 28040 Madrid, Spain

<sup>3</sup>Politecnico di Milano, Dipartimento di Energia, via La Masa 34, 20156 Milano, Italy

<sup>4</sup>INFN – Milano, Via Celoria 16, 20133 Milano, Italy

<sup>5</sup>GRRI - Departament de Física, Universitat Autònoma de Barcelona. 08193 Bellaterra, Spain

<sup>6</sup>INFN Sezione di Torino, via Pietro Giuria 1, 10125 Torino, Italy

<sup>7</sup>Università degli Studi di Torino, Via P. Giuria 1, 10125 Torino, Italy

\*Corresponding author. R. Bedogni. roberto.bedogni@lnf.infn.it

### Abstract

CSYP (CYlindrical SPectrometer) is a directional neutron spectrometer based on a single moderator embedding multiple thermal neutron detectors. Similarly to Bonner Spheres, CYSP responds from thermal up to GeV neutrons and the spectrum is obtained via few-channel unfolding methods. CYSP has the shape of a polyethylene cylinder with diameter 50 cm and height 65 cm. Owing on a thick collimator and on a specifically designed shielding structure, the internal detectors only respond to neutrons coming from a known direction. Internal thermal neutron detectors are one-cm<sup>2</sup> <sup>6</sup>LiF-covered silicon diodes.

An upgraded version of CYSP was developed to work in low intensity applications, such as cosmic field measurements. It is called CYSP-HS (High-Sensitivity) and is equipped with large area <sup>6</sup>LiF-covered silicon diodes (LATND, Large Area Thermal Neutron Detectors). Compared with the former CYSP, the sensitivity increased approximately by an order of magnitude.

This paper presents CYSP-HS focusing on the new internal detectors, the response matrix and its verification in a reference field of Am-Be available at the Politecnico di Milano.

**Keywords:** Neutron spectrometry; Neutron dosimetry; CYSP, CYPS-HS, NESCOFI, NEURAPID, Single-moderator, directional spectrometry

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