

NEDA: NEutron Detector Array for spectroscopy studies

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Future studies of exotic nuclei will mainly be performed by using reactions induced by radioactive as well as high-intensity stable heavy ions. The need for efficient neutron detection is not only required in heavy-ion fusion-evaporation reactions close to the proton dripline, but also as "veto" detectors for suppression of reaction channels with high neutron multiplicity in studies of neutron-rich nuclei.

The new NEutron Detector Array (NEDA) is a collaborative European effort to construct a modern neutron detector array for experiments with stable and radioactive ion beams. The project benefits from the long-standing experience developed with the realization and use of the Neutron Wall, a highly efficient medium granularity neutron detector array used in combination with the EUROBALL spectrometer and later with EXOGAM. The new device will be versatile and optimized for the operation with stable beams and second generation radioactive ion-beam facilities (SPES, SPIRAL2, FAIR, etc.). NEDA will be composed of 355 detectors, covering a solid angle of about 2π and will be used as an ancillary detector of AGATA, GALILEO, EXOGAM2 and PARIS. Digital electronics with pulse-shape discrimination capabilities will be used. NEDA will allow the selection of neutron channels in nuclear reactions, providing multiplicity and energy information. It will be realized in different stages, the first one being an upgraded version of the Neutron Wall.

A large effort has been devoted, so far, to the validation of the simulations and test of the future prototypes of NEDA. New detector materials as well as traditional ones have been investigated and characterized, in particular, deuterated liquid scintillators as BC537 and the conventional BC501A. Pulse shape discrimination algorithms have been investigated for both liquid scintillators. A design study of the NEDA array geometry is being performed in order to optimize the granularity, the solid angle coverage in conjunction with the future gamma-ray arrays. In this presentation, the physics domain of NEDA as well as the status of the R&D of the NEDA detector array will be discussed.

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