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Hadron Calorimeters for the future High Energy Physics Nuclear Experiments

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The design and performance of the hadron calorimeters developed for the future high energy nuclear physics experiments at FAIR, NICA, and CERN will be discussed. The Projectile Spectator Detector (PSD) for the CBM experiment at the future FAIR facility, the Forward Calorimeter for the NA61 experiment at CERN and the Multi Purpose Detector at the future NICA facility are reviewed. These detectors are compensating lead-scintillator calorimeters designed to measure the energy distribution of the forward going projectile nucleons and nuclei fragments (spectators) produced close to the beam rapidity. Design of detector modules is presented. Readout electronics is described with an example of PaDiWa frontend board to be used for the PSD CBM. Results of performance study of the centrality and reaction plane determination for the PSD for CBM are reported. Detectors radiation hardness to ionizing and neutral particle fields is discussed with an accent on the radiation hardness properties and investigation methods for detectors exposed to the high neutron radiation. Results of neutron radiation hardness tests for the Avalanche Photodiodes (APDs) used for the light readout in the calorimeter modules are presented.

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