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Forward hadron calorimeters for fixed target heavy ion experiments

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Forward hadron calorimeters with transverse and longitudinal segmentation are developed for upgraded heavy ion NA61/SHINE, BM@N experiments and future CBM experiment at FAIR. The main purpose of these calorimeters is to provide an experimental event-by-event measurements of the centrality and orientation of reaction plane in heavy-ion collisions at high beam rates. One of the features of these modular calorimeters is the presence of a beam hole in the centre, which is necessary for the operation at high beam rates. Hadron calorimeters in all of these experiments are composed of sampling lead/scintillator modules with longitudinal segmentation. Light collection in the modules is provided by WLS fibers embedded in grooves in the scintillator plates. The light from 6 consecutive scintillator plates in the module (section) is collected together and is detected by one Hamamatsu MPPCs with an active area of 3x3mm2 placed at the end of module. The light yield measured with muons beam is about 40-50 ph.e./section. The response of supermodule (array 3x3 assembled from 9 CBM modules) has been studied on CERN T9, T10 and NA61/SHINE proton beams in the energy range 1.5-150 GeV. The features of the calorimeters operation in NA61/SHINE, BM@N and CBM experiments, results of the measured response of the supermodule and expected radiation conditions simulated for these calorimeters will be presented.

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