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Simulation of a hadron calorimeter for Jefferson Lab Hall-A Super Bigbite Spectrometer VAHE MAMYAN, Carnegie Mellon University, SBS COLLABORATION — A “shashlik” hadron calorimeter is being designed for the new Super Bigbite Spectrometer in Jefferson Lab Hall-A. The calorimeter will be used in nucleon-coincidence form-factor experiments after Jefferson Lab’s 12 GeV upgrade. A Geant4 simulation has been developed to optimize hadron-detection efficiency, time and spatial resolution in a momentum range of 2-10 GeV/c. Significant efforts were made to implement the simulation as realistically as possible. Simulation has been validated by measuring detector-response time resolution for cosmic ray muons in hadron calorimeter blocks of a similar design, used in the COMPASS experiment. Tests with a short decay-time combination, ELJEN 232 scintillator and ELJEN 299-27 wavelength shifter (WLS), were also conducted to study their suitability. The results of these tests indicate that the simulation is able to predict time resolution with better than 5% precision and the ELJEN scintillator WLS combination is suitable for the hadron calorimeter. Simulation indicates ~ 1.5 ns FWHM time resolution, 5-3 cm spatial resolution and more than 90% hadron detection efficiency in the momentum range of 2-10 GeV/c.

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