

Construction of a Digital Hadron Calorimeter with Resistive Plate Chambers

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We report on the development of a Digital Hadron Calorimeter (DHCAL), built with Resistive Plate Chambers (RPCs) and $1 \times 1 \text{ cm}^2$ readout pads as the active medium, for use in a detector optimized for the application of Particle Flow Algorithms to the measurement of jet energies.

We present the concept and design of a DHCAL and report on the progress in constructing a prototype DHCAL which is about one cubic meter in size. This prototype will contain ~ 40 layers and the total number of channels will be close to 400,000. The RPC and readout system construction and tests are on going now, and we plan to finish construction in Spring 2010. The prototype DHCAL will be tested extensively at Fermilab MTBF.

In order to prepare the operation of a large system that consists of ~ 120 RPCs, we also tested the RPC performance (efficiency, MIP multiplicity and noise rate) as a function of environmental parameters (temperature, pressure and humidity) and gas flow rate. This result will be presented, and has been submitted to JINST for publication.

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