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Cesium Iodide Crystal Calorimeter of the Proton Computed Tomography (pCT) Imager JESSICA MISSAGHIAN, HARTMUT SADROZINSKI, BRIAN COLBY, Santa Cruz Institute for Particle Physics, VICTOR RYKALIN, Northern Illinois University, FORD HURLEY, Loma Linda Medical University — Researchers at SCIPP, LLMU and NIU have collaborated to make a functioning proton imager. Proton Computed Tomography (pCT) is designated to be applied in proton therapy of human cancer systems. It will image head-sized phantom objects and provide excellent space and energy resolution using a silicon microstrip tracker and crystal calorimetry. The residual energy could be measured with precision of a few percent using a Cesium Iodide crystal calorimeter. A single element of the CsI(Tl) calorimeter was tested in order to understand the behavior of the future calorimeter system. We present test results on a CsI(Tl) calorimeter element with proton beams of 35, 100 and 200MeV. The detector element was designed to comply with the demands of high energy resolution of a few percent and a dynamic range of two orders of magnitude (1-300MeV) under a counting rate of 10 kHz per channel. We also report on cosmic measurement results of each crystal of the future calorimeter matrix. A detailed description of the calorimeter data acquisition system will be given.

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