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GRAPE: A Compton Polarimetry Experiment TAYLOR CONNOR, PETER BLOSER, JASON LEGERE, MARK MCCONNELL, JAMES RYAN, UNH — We review the design, calibration and data analysis of the Gamma Ray Polarimetry Experiment (GRAPE), a Compton polarimeter device for measuring the polarization of photons in the 50-500 keV energy range. In Compton scattering, X-ray and gamma-ray photons tend to scatter at right angles with respect to their polarization vector. We exploit this fact to measure the polarization of the incident radiation by looking at the azimuthal distribution of the scattered photons. This distribution gives us a measure of both the level of polarization and the orientation of the polarization vector. These measurements will allow us to probe the particle acceleration regions of astronomical sources. GRAPE will be flown in the fall of 2011 on as a high altitude balloon payload. The primary target of that flight will be the Crab Nebula, with the Sun (solar flares) and Cygnus X-1 as secondary targets. Our observations of the Crab will be compared to the findings of the INTERNATIONAL Gamma-Ray Astrophysics Laboratory (INTEGRAL), which provided constraints on the location of the particle acceleration region within the Crab Nebula. Following the initial flight in 2011, we hope to fly GRAPE on a long duration balloon flight from Antarctica to study gamma-ray bursts.

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