Meeting the Challenges of Heavy Ion and Spin Physics Programs with PHENIX EM Calorimeter

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At PHENIX experiment, EM calorimeter plays an important role for both heavy ion and spin physics. There are many requirements from both physics to cover wide energy range. Heavy ion physics wants to access as low p_T ($\sim$100MeV/c) as possible to detect soft photon signal from the QGP state. The detection of soft plural photons in this region requires to reject low energy anti-neutrons and other hadrons with the timing measurement. It requires as low threshold energy as possible. For spin physics, we are interested in the high p_T ($<$80GeV/c) region. The highest p_T in which spin physics has interest comes from decay electron/positron of weak bosons. Prompt photon measurement also requires a p_T range up to 30 GeV/c.

To cover this energy range, we need many considerations and established schemes. First, we have to establish a calibration system. We use laser input to absorb time-dependent gain variation. The absolute factor between ADC channel and energy is obtained using transversely penetrating cosmic muon ($\sim$40MeV). Second, we need linearity of EM calorimeter and its readout. The electronic instability causes non-linearity at low energy. The non-linearity around cosmic muon peak directly makes deviation at higher energy. Shower leakage at high energy and PMT saturation make non-linearity at high energy. Systematic uncertainties in energy scale are fatal to cross section measurements. Thirdly, we use different H.V. settings for heavy ion physics run and spin physics pp run. This requires a transfer of calibration data between the different settings. For these issues, the result of our schemes will be shown.