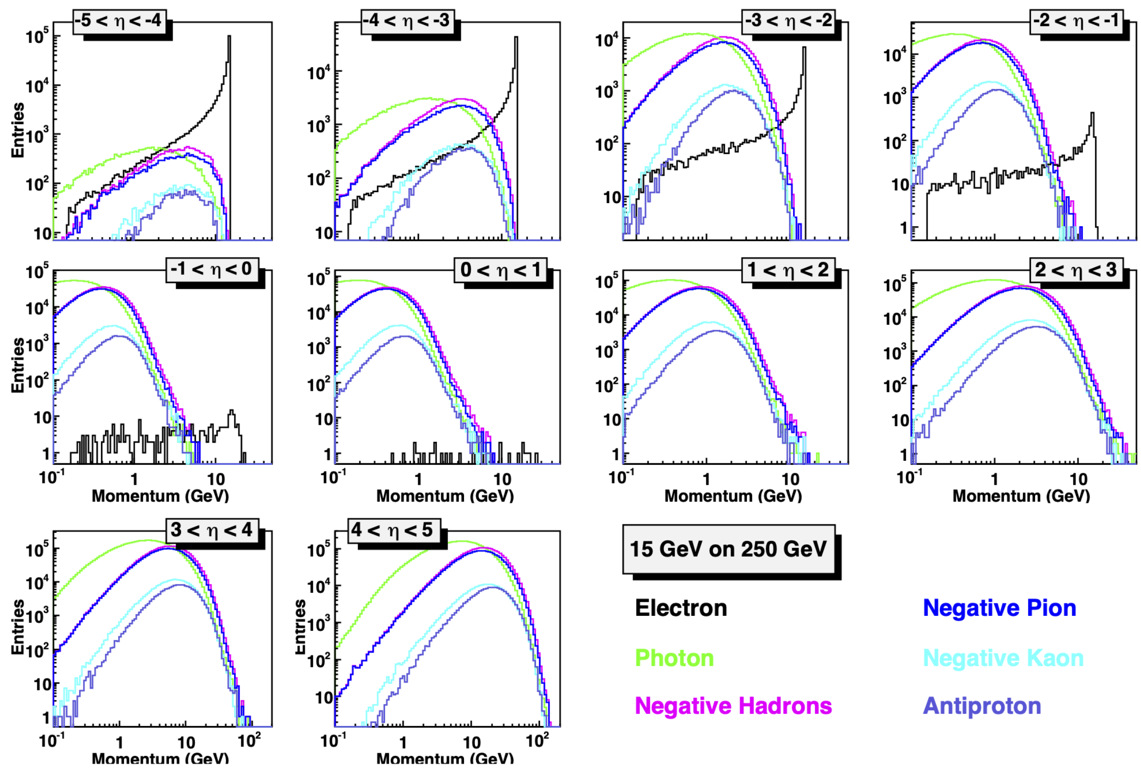

Figure 2.21: The momentum distribution for the scattered electrons (black), photons (greens), and negatively charged hadrons (magenta) for different pseudo-rapidity bins in the laboratory frame for beam energies of 18 GeV on 275 GeV. The distributions for negatively charged Pions (blue), Kaons (cyan) and antiprotons (violet) are shown as well. No kinematic cuts have been applied.

distributions for hadrons (both charged and neutral) and the scattered lepton can overlap and need to be disentangled. For $\eta < -3$ electron, photon and charged hadron rates vary from being comparable to a factor of 10 different. For the higher pseudo-rapidities electron rates are a factor of 100–1000 smaller than photon and charged hadron rates, and comparable at a 10 GeV/c total momentum. For very high Q^2-events a suppression factor of > 100 is needed. This adds another requirement to the detector: **excellent electron identification**. It is noted that the kinematic region in pseudo-rapidity over which hadrons and also photons need to be suppressed, typically by a factor of 10–1000, shifts to more negative pseudo-rapidity with increasing center-of-mass energy. Measuring the ratio of the energy and momentum of the scattered lepton, typically gives a reduction factor of $\sim$100 for hadrons. This requires the availability of both tracking detectors (to determine momentum) and electromagnetic calorimetry (to determine energy) over the same rapidity coverage. By combining information from these two detectors, one also immediately suppresses the misidentification of photons in the lepton sample. Having good tracking detectors with similar rapidity-coverage as electromagnetic calorimetry similarly aids the y-resolution at low y from the lepton method. The hadron suppression is further