u-channel ρ^0 Benchmark Figures

`benchmark_rho_mass.pdf`: This figure shows the reconstruction of the ρ^0 mass. The **black** histogram is the invariant mass of each MC $\pi^+\pi^-$ pair after being processed by the afterburner. The **blue** histogram is the invariant mass of reconstructed $\pi^+\pi^-$ pairs with no cuts on acceptance. PDG codes were used to select pions, although this PID is unrealistic. In the absence of PID, the ρ^0 will be reconstructed from each oppositely-charged track. The dominant combinatorial background from this approach comes from pairing protons with the π^-. This $m_{p\pi^-}$ background is shown by the red histogram. The sum of the signal and background is shown in **magenta**.

`benchmark_rho_mass_cuts.pdf`: This figure shows ρ^0 mass reconstruction for events in which both MC-level pions should be within the B0 acceptance ($9< \theta <13$ mrad with respect to the hadron beam pipe). The **black** histogram is the invariant mass of each MC $\pi^+\pi^-$ pair which passes this θ cut after being processed by the afterburner. The **magenta** histogram is the invariant mass of reconstructed $\pi^+\pi^-$ pairs for these same events. PDG codes were used to select pions. The **magenta** and **black** distributions were integrated over $0.6 < m < 1$ GeV to calculate the ρ^0 reconstruction efficiency.

`benchmark_rho_dNdu.pdf`: To make this figure, the Mandelstam $u = (p_{\rho^0} - p_{pbeam})^2$ was calculated for each event and events were binned in $-u$. The initial momentum of the proton beam is from the afterburned generator-level MC event information. The momentum of the ρ^0 was calculated three ways. The first method shown in **black** reconstructs the ρ^0 from afterburned MC-level pions. The second method shown in **blue** reconstructs the ρ^0 from reconstructed tracks which are then confirmed to be pions by their PDG codes. The third method shown in **magenta** is more realistic and reconstructs the ρ^0 from each reconstructed $p\pi^-$ and $\pi^+\pi^-$ pair. The **magenta** curve is higher in amplitude than the **black** because in many events both the proton and π^+ were successfully reconstructed so there is some double counting. We are interested in the exponential drop-off of the cross section with increasing $-u$. So the distributions were fit over $0.2 < -u < 1.2$ GeV^2 with a function of the form $\sim \exp[\alpha(-u)]$ to evaluate the slope parameter α reconstruction.

`benchmark_rho_efficiencies.pdf`: This figure is the efficiencies of pion reconstruction binned in p_T vs. η and η vs ϕ (azimuth) where η is defined with respect to the hadron beam pipe. The kinematics were calculated from the afterburned MC-level pion kinematics. Then the pions were counted as reconstructed if one of reconstructed tracks matched the PDG ID of that pion.

`benchmark_rho_recoquality.pdf`: This shows the momentum and p_T reconstruction quality of charged pions. For each reconstructed charged pion, its PDG code was used to identify it. Then the reconstructed momentum and p_T were compared against the afterburned MC-level kinematic information.