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Transverse Distributions of the Strange Cloud of the Proton[1]
ETHAN PURCELL, ENRIQUE SANCHEZ, MACQUARRIE THOMSON, Seattle University — Due to the Heisenberg uncertainty principle, a proton can generate a cloud of strange particles as it splits into a strange meson/baryon pair: a K or K^* meson and a Λ or Σ baryon. At relativistic speeds the proton is contracted into a disk transverse to its momentum. Our goal is to calculate the transverse momentum distributions and determine the transverse spatial distributions of the strange mesons. We use a light cone model for the two-body wave function $\psi(y,\ k_\perp)$ that describes the probability that a proton will split into a meson/baryon pair in which the meson has longitudinal momentum fraction y and transverse momentum $k_\perp$. We analytically integrate $\psi(y,\ k_\perp)$ to determine $f(y)$, the probability of the meson-baryon fluctuation for a given y. We numerically integrate $f(y)$ and compare to total fluctuation probabilities, and use this to normalize our distributions. $\psi(y,\ k_\perp)$ depends upon a parameter α which describes the shape of the fluctuation function. We study the dependence of the transverse momentum distributions on α. We then use a Bessel function transformation of $\psi(y,\ k_\perp)$ to determine the transverse spatial extent of the kaon cloud, and compare it to the expected scale of $1/m_K$.

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