

Estimation of Combinatoric Background in SeaQuest using an Event-Mixing Method

The J/ψ particle is a spin-1 charmonium state with significant decay fraction towards lepton pairs. The distribution of decay particles from the J/ψ is influenced by its spin alignment, which provides insights into different production mechanisms. SeaQuest, a fixed target experiment at Fermilab, was designed to observe muon pairs from charmonium and Drell-Yan production in pp and pd interactions. The dimuons, produced from $J/\psi \rightarrow \mu^+\mu^-$ decays, recorded by SeaQuest can be utilized to examine the spin alignment of the J/ψ particle. In addition to the desired dimuon signals, the recorded data also includes combinations of two muon tracks that do not originate from a common physics vertex. We present an event-mixing method that accurately calculates this combinatorial background with appropriate normalization. This method can be extended for use in other experiments that observe dilepton pairs.

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