

Test of the OZI rule and spin alignment measurements with the COMPASS > experiment at CERN

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The Okubo-Zweig-Iizuka (OZI) rule states that processes with disconnected quark lines are suppressed. The production of phi mesons from non-strange hadrons is predicted to be suppressed w.r.t. omega by a factor $4.2 \cdot 10^{-3}$. Violations are often interpreted as gluonic intermediate states or as evidence for hidden strangeness in the nucleon. The reaction $pp \rightarrow pVp$ ($V = \omega, \phi$) has been studied with the COMPASS spectrometer in 2008 and 2009, using a 190 GeV/c proton beam impinging on a liquid hydrogen target.

The cross section ratio was measured and a significant OZI violation factor of ~ 4 was found. Its kinematic dependence of the Feynman x_F and the $M(pV)$ mass is discussed in terms of diffractive production of baryon resonances in competition with central production.

The $M(p\omega)$ spectrum has a rich structure, indicating the importance of baryon resonances decaying into $p\omega$, in sharp contrast to the structureless $M(p\phi)$ spectrum.

The spin density matrix element ρ_{00} of the vector mesons in selected reference frames provides another handle to distinguish the contributions of these two major reaction types. Again, dependences of the alignment on x_F and $M(pV)$ are found.

Outside the resonant region, the OZI violation factor is ~ 8 , independently of x_F .

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