Cross Section Measurement for $Z(\gamma) \rightarrow \mu\mu\gamma$ in $p\bar{p}$ Collisions at the Tevatron

ANDREW KOBACH, Northwestern University — The Standard Model describes the electroweak interaction by the non-abelian gauge group $SU(2) \otimes U(1)$, and under symmetry transformations, the electroweak gauge bosons ($Z$, $W^\pm$, $\gamma$) can self-interact, however in the Standard Model, a $Z(\gamma)$ coupling is not permitted.

Using data collected since July 2006, $Z(\gamma) \rightarrow \mu\mu\gamma$ events were studied using the Run IIb DØ detector at the Tevatron. Topologically permitted Standard Model $\mu\mu\gamma$ events include initial radiation of a photon by a quark and a subsequent decay of a $Z$ to two muons, or where one of the leptons from the $Z$ radiates a hard photon. If the measured cross-section of $Z(\gamma) \rightarrow \mu\mu\gamma$ is significantly different compared to the theoretical prediction, this is strong evidence for new physics associated with $Z(\gamma)$ coupling. Using the largest dataset to date for such a measurement, this work in progress will culminate in an observation in new physics or will set the tightest limits on anomalous gauge couplings in the world.

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