

Abstract Submitted  
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**Measurement of the  $Z/\gamma^*Z/\gamma^*$  production cross section using the fully charged leptonic decay channel from  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV using the D0 detector** RYAN HOOPER, Bradley University and Brown University, D0 COLLABORATION — We present a measurement of the  $\sigma(Z/\gamma^*Z/\gamma^*)$  production cross section in  $p\bar{p}$  collisions at a center-of-mass energy of  $\sqrt{s} = 1.96$  TeV, by observing the four charged lepton final state where  $Z/\gamma^*Z/\gamma^* \rightarrow \ell^+\ell^-\ell'^+\ell'^-$  ( $\ell, \ell' = e$  or  $\mu$ ). This study utilizes  $6.4 \pm 0.3 \text{ fb}^{-1}$  of data collected by the D0 experiment at the Fermilab Tevatron Collider, where we observe ten candidate events with an expected background of  $0.35 \pm 0.04$  events. The p-value of background only fluctuating to the observed number of events or greater is less than  $1.3 \cdot 10^{-9}$  ( $> 6\sigma$  gaussian equivalent). The resulting high mass ( $M_1(Z/\gamma^*) > 70 \text{ GeV}$ ,  $M_2(Z/\gamma^*) > 50 \text{ GeV}$ ) cross section measurement is  $\sigma(p\bar{p} \rightarrow Z/\gamma^*Z/\gamma^*) = 1.35_{-0.40}^{+0.50}(\text{stat}) \pm 0.15(\text{syst}) \text{ pb}$ . This result represents the most precise measurement to date for this rare process. We also show various kinematic distributions of our ten candidate events which illustrate that we are at the beginning stages of utilizing  $Z/\gamma^*Z/\gamma^*$  phenomena to probe for new physics.

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