

# EVIDENCE FOR A MASS DEPENDENT FORWARD- BACKWARD ASYMMETRY IN TOP QUARK PAIR PRODUCTION

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We present a new measurement of the inclusive forward-backward  $t\bar{t}$  production asymmetry and its rapidity and mass dependence. The measurements are performed with  $5.3 \text{ fb}^{-1}$  of  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96 \text{ TeV}$ , recorded with CDF II at the Fermilab Tevatron. Significant inclusive asymmetries are observed in the laboratory and  $t\bar{t}$  rest frame, and are consistent with CP conservation under interchange of  $t$  and  $\bar{t}$ . In the  $t\bar{t}$  rest frame, the asymmetry increases with the  $t\bar{t}$  rapidity difference,  $\Delta(y)$ , and with the invariant mass  $M_{t\bar{t}}$  of the  $t\bar{t}$  system. Parton-level asymmetries are derived in two regions of each variable, and the asymmetry is found to be most significant at large  $\Delta(y)$  and  $M_{t\bar{t}}$ . For  $M_{t\bar{t}} > 450 \text{ GeV}/c^2$ , the parton-level asymmetry in the  $t\bar{t}$  rest frame is  $A^{t\bar{t}} = 0.475 \pm 0.114$  compared to a next-to-leading order QCD prediction of  $0.088 \pm 0.013$ .

Particle  
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Seminar

All interested  
persons are  
cordially  
invited to  
attend.