

Asymmetric Left-Right Model and the Top Pair Forward- Backward Asymmetry

Chiu-Tien Yu

UW-Madison

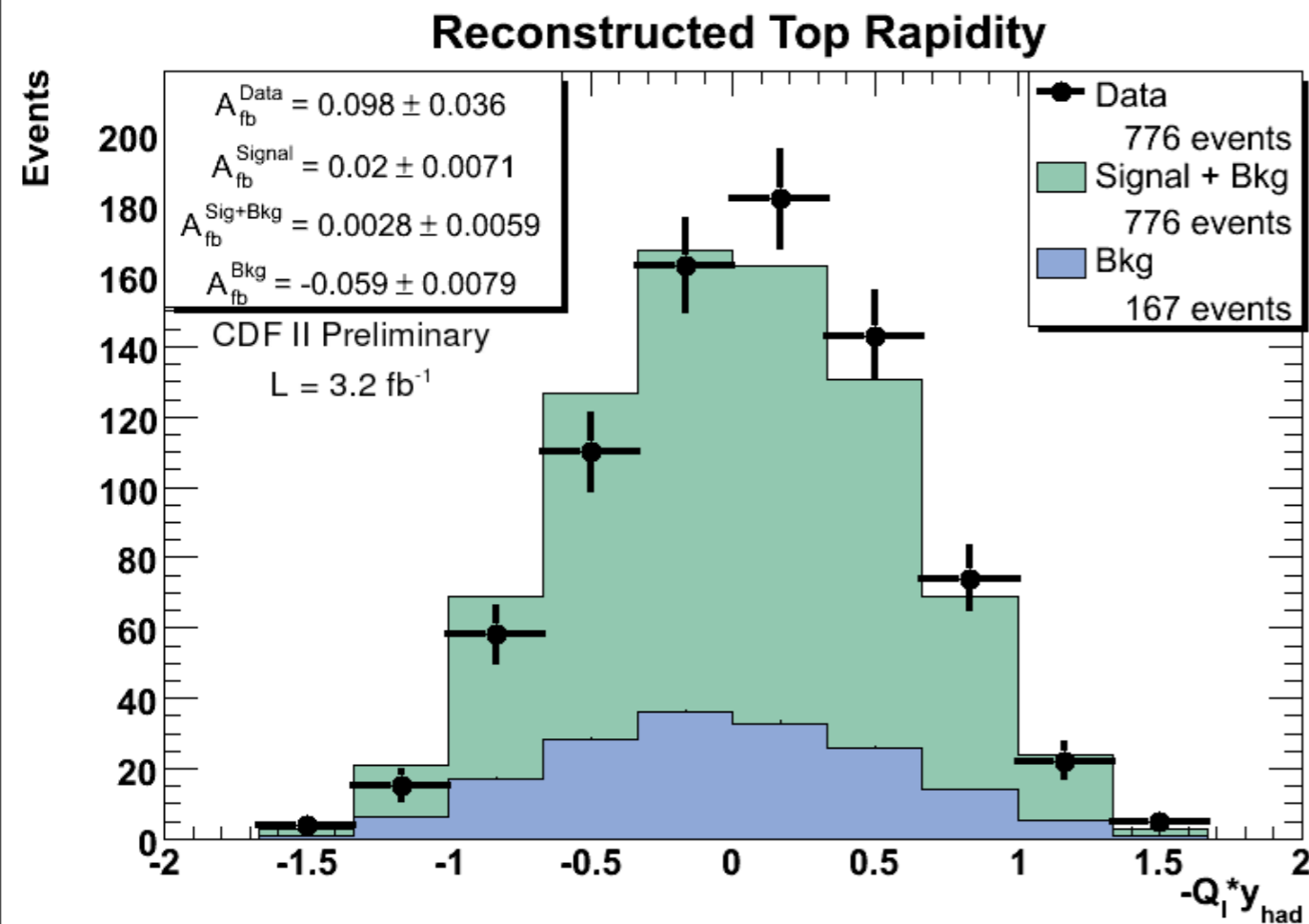
In collaboration with Vernon Barger and Wai-Yee Keung

arXiv: hep-ph/1002.1048

Cargèse 2010



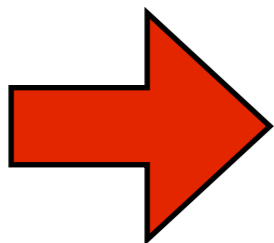
Forward-Backward Asymmetry at the Tevatron



$$A_{FB}^{p\bar{p}} = 0.19 \pm 0.07_{stat.} \pm 0.02_{syst.}$$

≠

$$A_{FB}^{p\bar{p}}(SM) \simeq 0.080$$



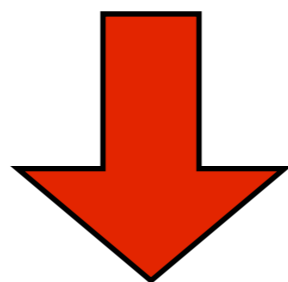
New Physics?



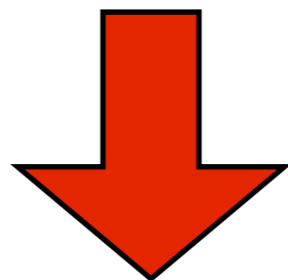
Asymmetric Left-Right Model



$$U'(1) \times SU'(2) \times SU(2)$$

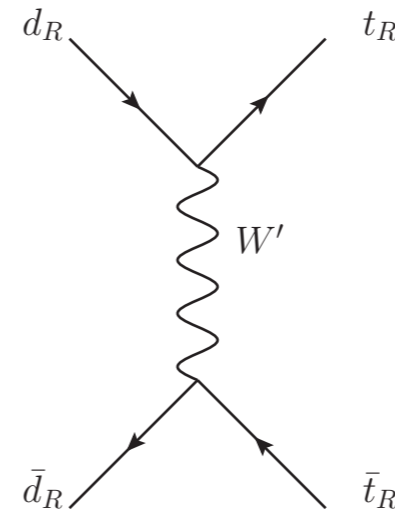
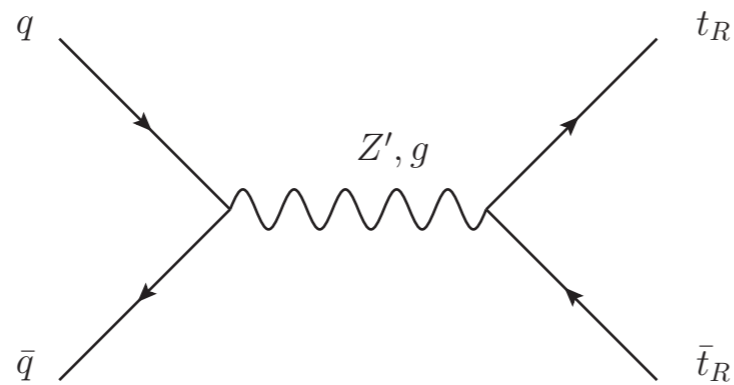


$$U_Y(1) \times SU(2)$$



$$U_{EM}(1)$$

New interactions

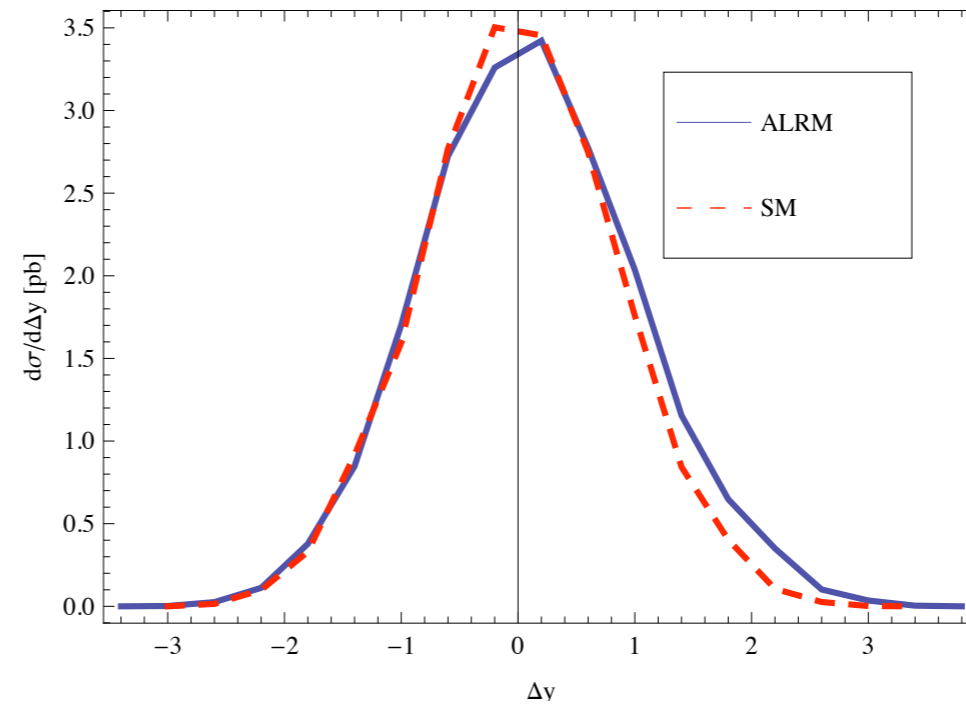
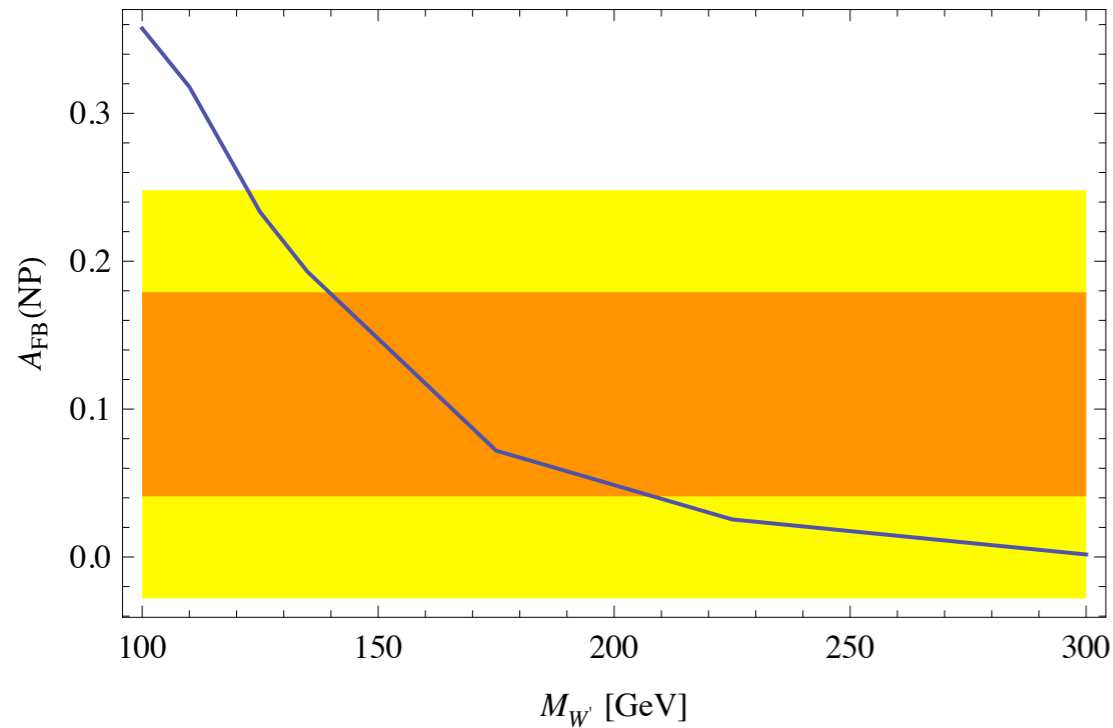


$$L \supset g' (\bar{t}, \bar{d})_R \gamma^\mu T'_3 Z'_\mu \begin{pmatrix} t \\ d \end{pmatrix}_R$$

$$L \supset (g'_2/\sqrt{2}) \bar{t}_R \gamma^\mu d_R W'_\mu$$

$$T'_3 = \begin{pmatrix} \frac{1}{2} & 0 \\ 0 & -\frac{1}{2} \end{pmatrix}$$

Results



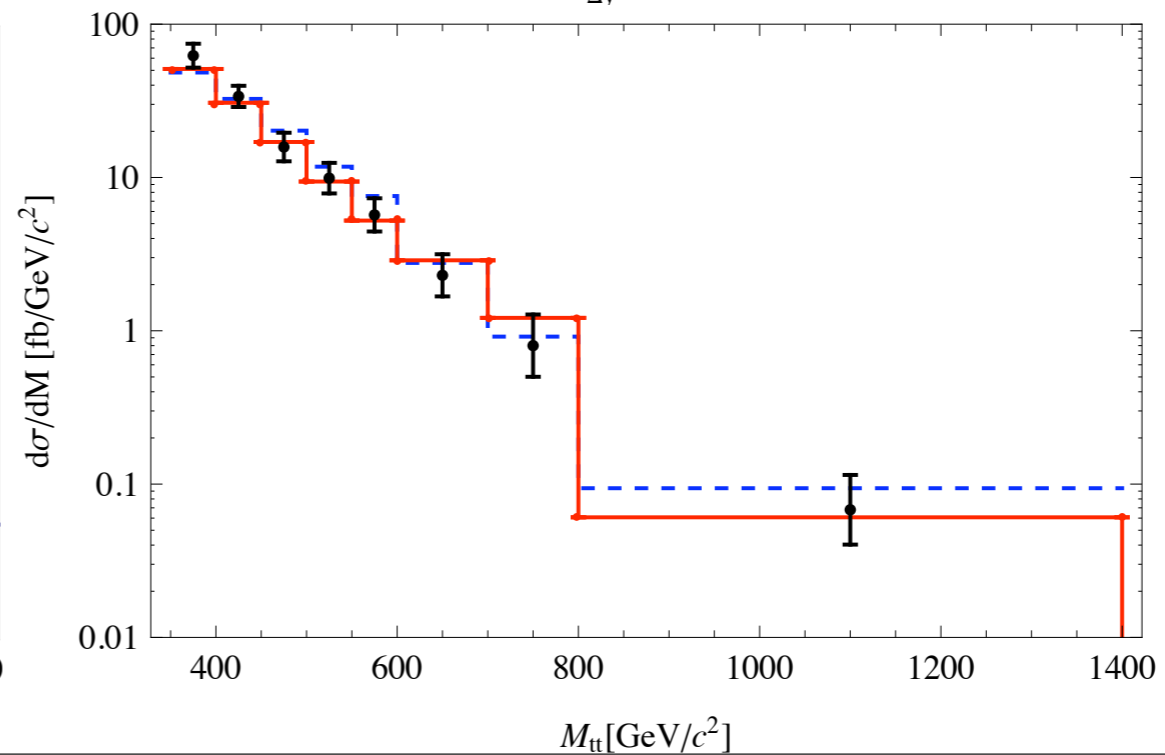
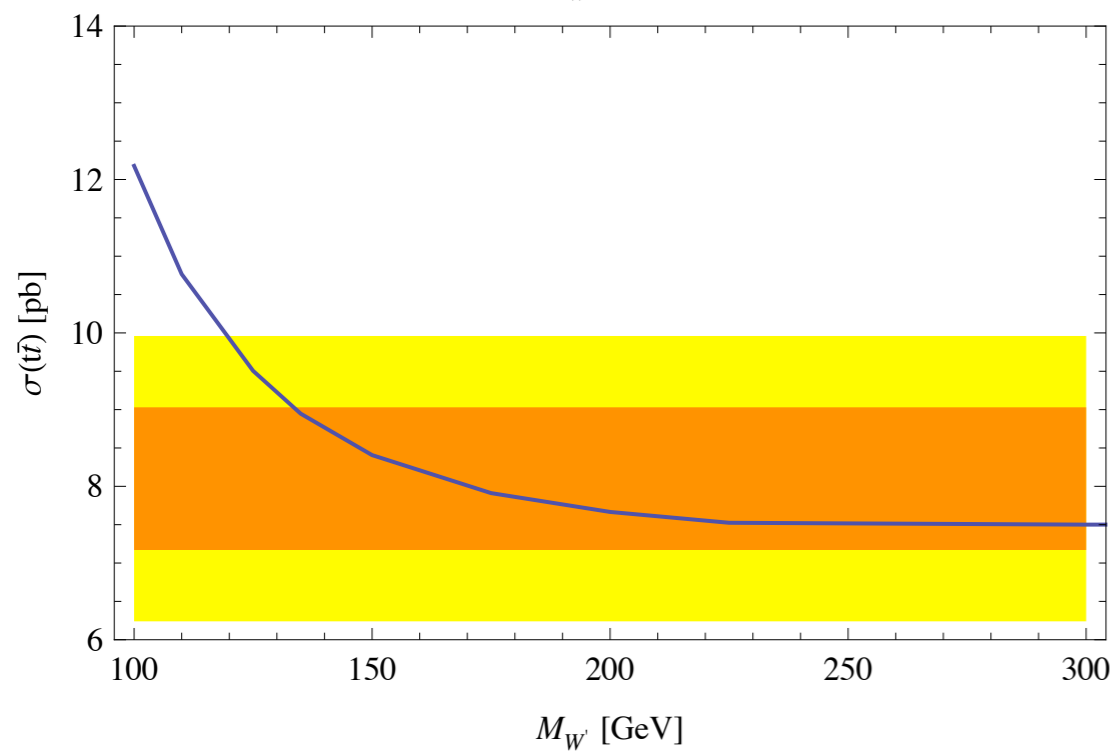
$$g_2' = 1$$

$$M_{Z'} = 900 \text{ GeV}$$

$$M_{W'} = 175 \text{ GeV}$$

$$m_t = 173.1 \text{ GeV}$$

$$\mu_F = \mu_R = m_t$$



Summary



- CDF and D0 see a deviation from the SM in the top-pair production.
- Possible sign of new physics: new vector bosons, axigluons, flavor-violating couplings.
- We extend the SM gauge group to $U'(1) \times SU'(2) \times SU(2)$ where the $SU'(2)$ acts on $(t, d)_R \rightarrow W', Z'$ bosons
- We find that $M_{Z'} = 900$ GeV, $M_{W'} = 175$ GeV, and $g'_2 = 1$ gives a good fit to the experimental values for top-pair production cross-section, A_{FB} , and invariant mass distribution.

Back-up

Dimuon limits on Z' mass

