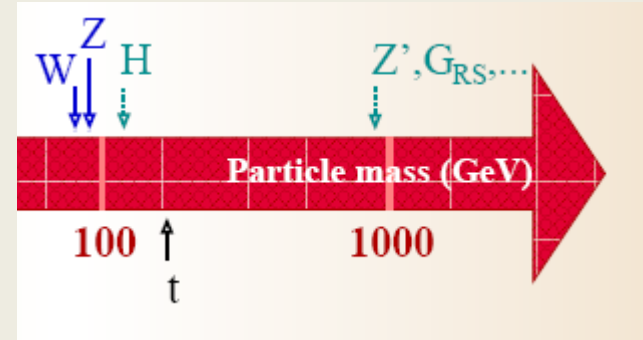


S. Dalley & P. Nadolsky, Dept. Physics, SMU
Spin of Resonant Boson Production at LHC

New physics at $Q > 100 \text{ GeV}$

- Indirect constraints from electroweak precision measurements
- direct new physics searches



GOAL: Model-independent spin determination of resonant boson (H, Z', G,...) production via Drell-Yan $pp \rightarrow \gamma\gamma X$ at LHC



Center-Edge Asymmetry
in $z = \cos \vartheta^*$

Osland, Pankov, Paver, Tsytrinov, QCD LO Boson
 $d\sigma/dz$ "Center-Edge" Asymmetry in $pp \rightarrow ll X$
[hep-ph/0805.2734]

$$\sigma_{\text{CE}} \equiv \left[\int_{-z^*}^{z^*} - \left(\int_{-z_{\text{cut}}}^{-z^*} + \int_{z^*}^{z_{\text{cut}}} \right) \right] \frac{d\sigma(R_{ll})}{dz} dz.$$

What do we know about $\gamma\gamma$?

SM & Scalar Bosons (Higgs):

- Balazs, Berger, Nadolsky, Yuan, QCD NLO + NLL Resummation for SM + Higgs $d\sigma/d\Phi$ in $pp \rightarrow \gamma\gamma X$ [hep-ph/0704.0001]



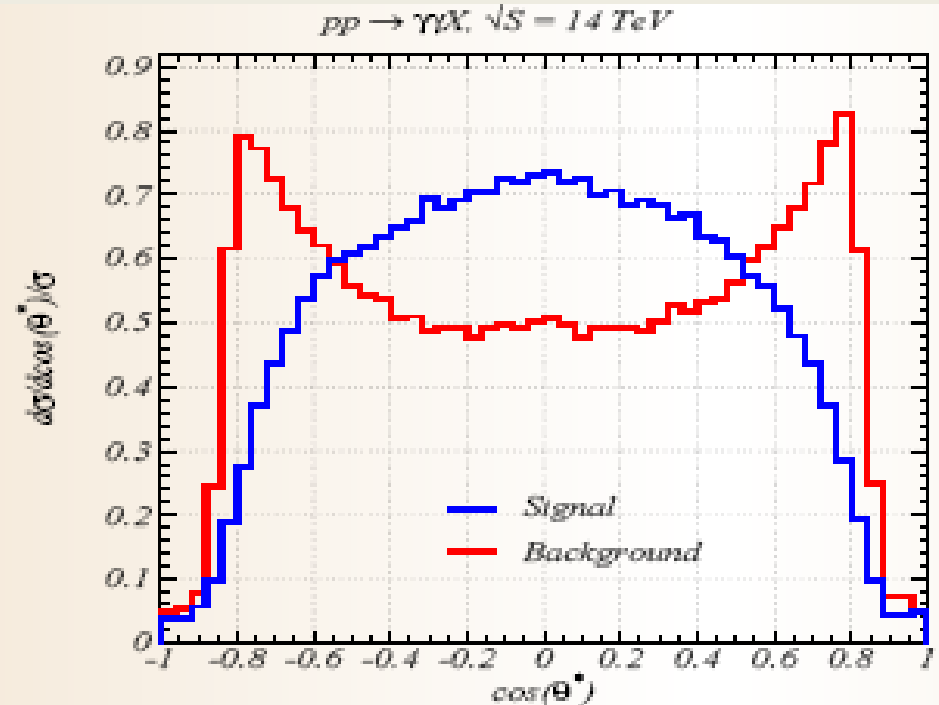
ResBos: Standard tool for Higgs searches

Vector Bosons:

No contribution to $\gamma\gamma$ final state

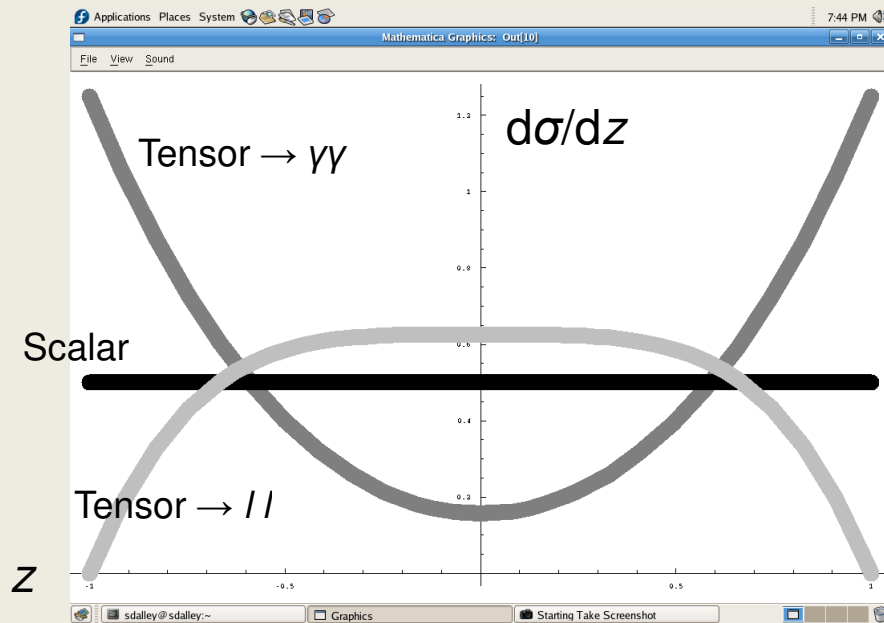
Tensor Bosons (KK-Gravitons):

- Kumar, Matthews, Ravindran, Tripathi, NLO QCD + Graviton $d\sigma/d\Phi$ in $pp \rightarrow \gamma\gamma X$ [hep-ph/0902.4894]
- Li, Li, Yang, NLO QCD + Resum + Graviton total σ [hep-ph/0606045]

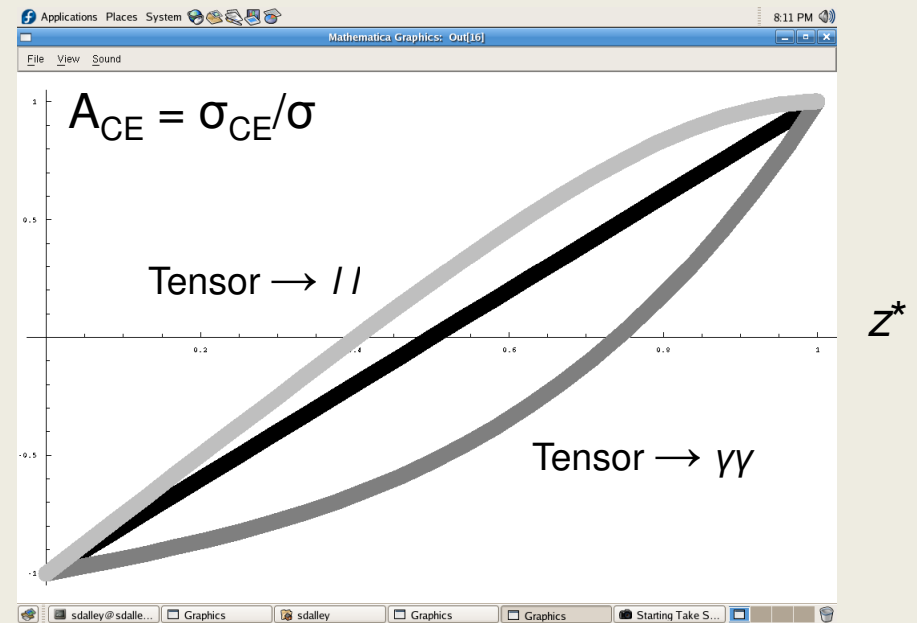


ResBos, normalized; $M_H = 130 \text{ GeV}$,

$z = \cos \vartheta^*$ dependence in LO QCD



No cuts, no SM background.
Assume gg PDF dominates.



- To-Do Summary: include QCD NLO + NLL Resummation of initial state radiation for Spin-2 resonance in $pp \rightarrow \gamma\gamma X$ in RESBOS ($d\sigma/d\Phi$), include exp and theory cuts, compare A_{CE} for scalar and tensor resonances @ LHC