Survey of top properties in new physics models

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Motivation

- Top quark an interesting particle to study
  - Large mass suggests connection to EW symmetry breaking
  - Last remaining discoverd SM particle not studied
- Large sample sizes at both colliders:
  - LHC: 10^7 $t\bar{t}$ pairs in $10\,\mathrm{fb}^{-1}$
  - ILC: 5×10^5 $t\bar{t}$ pairs in $100\,\mathrm{fb}^{-1}$

$\Rightarrow$ strong experimental program, much work to calculate SM predictions

- Most new physics models must shift top properties because of its large mass

Scope of project: I

- Several general studies of anomalous top couplings, although gaps exist (see U. Baur's 8/17 talk)
- Literature on new physics predictions sparse and disjointed
- Start joint work with BSM group to calculate and catalog predictions

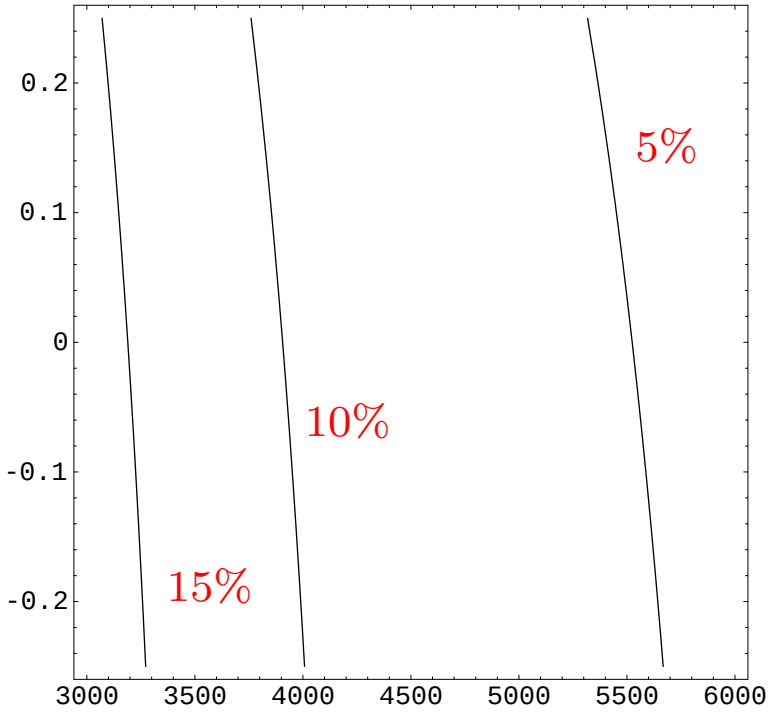
$\Rightarrow$ compare with LHC, ILC potential

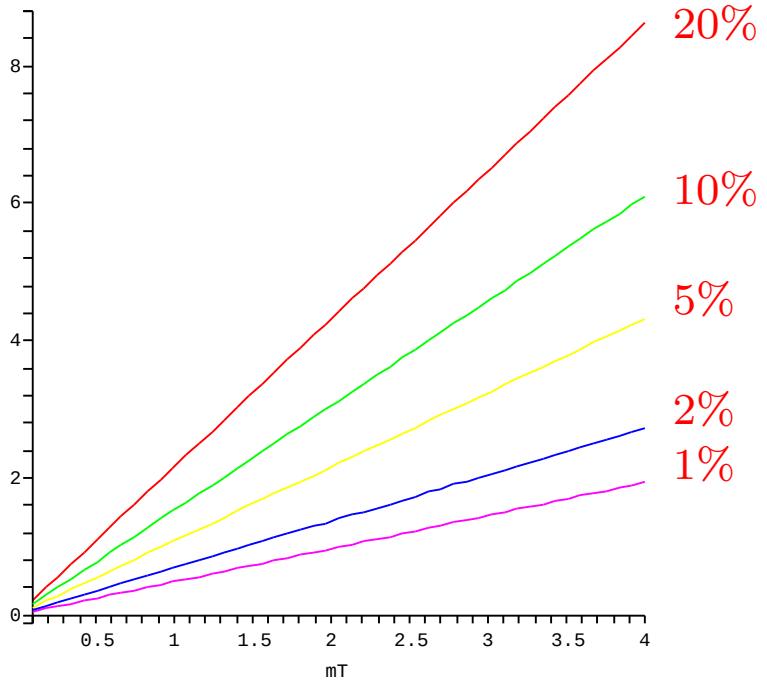
- Work begun with:
  - Kaustubh Agashe
  - Carola Berger
  - Shrihari Gopalakrishna
  - Ben Lillie
  - Maxim Perelstein

Scope of project: II

- Begin survey with:
  - SUSY, loop effects
  - Randall-Sundrum ED with matter in bulk
  - Top see-saw
  - Two-Higgs doublets
  - Little Higgs: Littlest Higgs, simple group LH, T-parity LH
- Study:
  - width
  - Wtb chirality
  - W longitudinal, transverse fractions
  - $Z\bar{t}t$, $\gamma\bar{t}t$

Results: Ztt shifts





- RS matter in bulk $\Rightarrow$ mostly t_R shift
- Littlest Higgs $\Rightarrow$ only t_L shift

  - LHC (ILC) can measure vector coupling to 50% (1%), axial coupling to 8% (1%)