Search for non-Standard Model interactions of the top quark at ILC

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The International Linear Collider

- Energy: from Z-mass to (at least) 1 TeV
- Electron and positron polarization
- TDR in 2013
- DBD for detectors
- Initial Energy 250 GeV
  - Footprint ~20km

Top quark production at ILC

- Pair production of the top quark can be studied at the ILC in two distinct regimes,
  - at the threshold
  - at high energies where the top quarks have relativistic velocities crucial to study the tth topologies

Experimental capabilities

- High efficient jet reconstruction and single particle separation Particle FLOW
  - 3% energy resolution
- Excellent tracking capabilities (>99% efficiency)
- Excellent Flavor tagging
  - Bottom and charm
  - Quark charge measurements
  - p+ and K+ in a high efficiency calorimeter
  - High efficiency (double tagging)

Top-quark mass

A key parameter in the SM

- The top threshold provides excellent sensitivity to the mass and other top quark properties
  - (more than) one order of magnitude better than HL-LHC
  - Using well-defined mass scheme
  - Sensitivity to: top-quark mass, width, yukawa coupling, strong coupling constant

BSM signatures: Top-EW couplings and FCNC

- Sensitivity to huge variety of models with comparisons and/or extra-dimensions complementary to resonance searches

Full simulation studies

- Optimizing top-quark threshold scan at ILC using genetic
  - K. Novak, A. Zorneck
- Radiative return to threshold in e^+e^- → tätγ
  - Genia, Foster