

Top quark parallel session Introduction

Kaustubh Agashe (Maryland)

Robin Erbacher (UC Davis)

Cecilia Gerber (UIC)

Kirill Melnikov (Johns Hopkins)

Reinhard Schwienhorst (MSU)

Friday night tops

- Discussion of plans for top quark studies on Friday night
<https://indico.fnal.gov/contributionDisplay.py?sessionId=10&contribId=82&confId=5841>
- Racetrack (WH7W)
- Remote access
 - ReadyTalk connection at phone number 866.740.1260
 - access code 2720540
 - evo: <http://evo.caltech.edu/evoNext/koala.jnlp?meeting=vsvivIeseBIBIIauaeItas>
 - evo password: topsnowmass
- Join us if you intend to study anything related to top quarks!

Organization

- Three main sub²groups:
 - Top and detectors
 - Precision measurements
 - ▶ top mass
 - ▶ top couplings
 - ▶ kinematics
 - Searches with top
 - ▶ rare decays
 - ▶ Resonances decaying to top
 - ▶ top partners
 - Will identify subgroup leaders
- Coordination of top in other groups
 - Liaisons
- Please let us know if you have a topic you would like to work on that is not mentioned

Communication

- Mailing list

- Will create one mailing list to communicate with all people interested in top
- Send us conveners email if you want to be added to the mailing list

- Twiki

- Use existing twiki page to exchange information
- Charge to the top group
- More details on topics

- Twiki to-do:

- Specific projects
- Bring together different interests
- Bring together theorists and experimentalists

- Top group meetings

- Will have regular meetings

Top and detectors

Top and detectors

- How well can top quarks be reconstructed at low energies and high energies (i.e., boosted top quarks)? What algorithms are available? Can they be improved? What is the impact of such improvements on physics questions discussed in the previous bullets?
- What is the energy resolution, identification and misidentification efficiency for each?
- What is required from the detector to be able to provide this?
- How can top quarks be used to improve b-tagging or jet energy resolution and other detector calibrations?

Top and detectors

- Are the LHC (linear collider) detectors sufficient for LHC (linear collider) top physics?
 - at low pt?
 - at high pt?
- Detectors for top at electron-proton collider?
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Precision measurements

Top quark mass

- How well can the top quark mass be measured at a hadron and at a lepton collider? Is there a good physics case for measuring the top quark mass with a precision that is significantly better than $O(1\text{GeV})$?
- The top quark mass is a renormalization scheme-dependent quantity. Does this ambiguity have an impact on the measurements of the top quark mass at a hadron collider with the current or ultimate precision?
- Can the total width of the top quark be measured in a model-independent way and to what precision?

Top coupling measurements

- What is the best way to parametrize deviations from SM predictions in couplings of top quarks to gluons, electroweak bosons, photons and the Higgs boson?
- What do we know about these deviations in couplings from direct and indirect measurements?
- Are there additional sources of CP-violation in the top-quark sector?
- What are the best ways to measure those couplings at a hadron collider and at a lepton collider? What precision can be obtained?
- Can the resulting determination of the visible decay width of the top quark, combined with a direct measurement of its width (at a lepton collider), have a significant impact on understanding invisible decay channels of the top quark?
- What improvements in experimental techniques and theoretical descriptions of top quark production processes are needed to achieve the ultimate precision?
- What is the impact that precise measurements of the top quark couplings to gauge bosons and the Higgs boson may have on our understanding of BSM physics?

Top kinematics

- What important SM physics information can be obtained by studying final states with top quarks?
- To what extent can precision studies of cross-sections and kinematic distributions for top-like final states at hadron colliders be used to constrain models of physics beyond the Standard Model?
- Which cross-sections and distributions are particularly important for this purpose? Are existing theoretical predictions for those final states adequate? What are the prospects for improving them?

Searches with top quarks

Searches in top decay

- Does the top quark decay to exotic final states? SM-like ($t \rightarrow c Z$ and $t \rightarrow c H$) or BSM-like ($t \rightarrow b H^+$)? How well can these decays be measured/constrained at hadron and lepton colliders?
- What sensitivity needs to be reached for these decays in order to have a significant impact on models of physics beyond the SM?
- Can the small CKM-matrix elements V_{ts} and V_{td} be directly measured via top quark decays? To what precision? Can this way to measure V_{ts} and V_{td} compete with their (possible) determination via top quark production processes? Can such measurements have an impact on understanding CKM-unitarity and provide important constraints on models of physics beyond the SM?

Searches for new particles

- Are there new particles that decay to top-like final states and other SM or BSM particles? What are the current constraints on their masses and couplings?
- What are the best ways to search for such particles at a hadron collider? What is the dependence on kinematics and final state? What sensitivity can be reached in such searches?
- Provided that such new particles exist, how well can their properties be measured in top-like final states?
- Are there indirect ways to search for heavy new particles that couple to top quarks (e.g., via their contribution to top quark production) at a sub-TeV lepton collider? What sensitivity can be obtained in such searches? What is the dependence on collider energy?
- Are there particles with top-like final states that could only be found at a multi-TeV lepton collider (especially non-colored ones)?