

TopPhysics@FCCee(TLEP)

the road ahead

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Top Physics at a e^+e^- collider

- The plan for running of FCC-ee span several centre of mass energies: from Tera-Z to 350GeV and maybe a 500GeV option (if well motivated).
- Where/when does top physics come in the program?
 - dedicated run at threshold @350GeV « Mega-Top » because of the 1M top pair produced
 - higher energy run @500GeV for ttH
 - run at 240GeV dedicated to Higgs precision measurement, can be used for single top studies
- the organization of the work to be done now is based on the deliverables needed from this physics program for the 2015 Spring deadline.

what to deliver

- These are the high priority topics that we feel is necessary to study immediately. Either because we know they are important, either to assess the potential of this proposal or exclude it:
 - **top mass measurement at threshold @350GeV: the measurement to do.**
 - need to compare with current ILC expectation.
 - need to have specific TLEP complete analysis.
 - **top rare decays (240 or 350): the real fast way to find BSM physics.**
 - need to explicitly evaluate the potential. Again, no TLEP real analysis done yet.
 - **single top physics @240GeV: is it possible?**
 - apparently a big potential due to the higher luminosity compared to ILC.
 - nobody ever looked. need to check it first because if it is feasible it could be a gold mine.

Top Group planning - Phase I

- My choice has been to identify a few experts interested in the topic above that could jump start the effort in a timely fashion.
 - I am extremely pleased by the feedback
 - Presentations today are the proof that now is the time to join in the effort.
 - We have been preparing the base so that it will be easier to inspire new groups to join in.
- Mass reconstruction: Frank Simon (best example of synergy with the ILC effort)
- Rare decays: Barbara Mele, great example of synergy with theorist. With the help of S. Biswas, F. Margaroli, P.A.
- Single Top: some interest from previous LEP experts Mario Antonelli (retrieved for us some specific MC generator code)

Other areas of work/contacts

- Inside the bigger scheme of the FCC-ee physics community we should not forget that we need also people that can cover the following roles:
- **Theory and Generator responsible:** for signal generation and systematics:
 - fully exploit the synergy with the studies done for ILC/CLIC
 - Contact toward the Theory section of TLEP organization
- **Contact with SM and BSM Physics Group:** for backgrounds and models
- **Contact with Machine interface Group** for energy measurement for mass measurement
Contact with TLEP Offline Group: for development of simulation and reconstruction tools:
 - profit from previous tools developed for Snowmass (Delphes)
 - nice tutorial given: <http://tlep.web.cern.ch/content/delphes-tutorial-fcc>
 - Reconstruction issues (and detector requirements) for Top physics are not « extreme » and they overlap largely with the Higgs. (similar backgrounds and energy scale)
 - One need in common that is fairly 'new' compared to previous studies would be the *development of a strong c-tagging (would make the difference for single-top as well)*
 - **Discussion of Delphes cards would need to happen in conjunction with the TLEP Detector Group: URGENT work for this Summer!!!**

Top Group planning - Phase II

- As it is natural, in the course of this initial work lots of new details for the analysis and new topics have come up: you will hear the new ideas in the talks after mine!
- I hope that during this workshop I will have the chance to meet with more interested people.
 - Recently a group from IPM Teheran joined in proposing studies on top rare decays —> presentation at a future Physics Vidyo meeting
 - I will reach out to the whole list of people that signed up with the list of uncovered topics
- NOTE! I am still **looking for a co-convener**: would like someone with some expertise, enthusiast and energetic, either experimentalist or phenomenologist to join me in this adventure.
- We will also put in place simple examples to generate signals and background simulated with Delphes (using for now the FCC_basic detector configuration) so that it will be very easy to start playing with the physics without the burden of starting from zero.
 - these will appear on the group twiki.

What next

- Some real work in progress that materializes with the presentations you will hear today.
 - this is the best way to move forward!
- Continuing scouting of interested people:
 - with personal contact with experimentalists
 - profiting of the synergy with ILC/CLIC
 - profiting of synergy with theorists/phenomenologists
- Profit as much as possible of synergies with other initiatives (such as the Italian Snowmass) to gather visibility and attract more people
- *I am around the whole time of the workshop don't hesitate to come and talk to me!*