

Top Quark Production at FCCee

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The success of the Standard Model (SM) of particle physics over the last few decades, continues with LHC experiments with in particular the Higgs boson discovery. This demonstrates the impressive robustness of this theory but also suggests that new phenomena, expected from the known SM incompleteness, seem to be out of LHC energy and precision reach. In addition, hundreds of direct beyond the SM (BSM) searches keep pushing exclusion limits to higher energy scales. In this context, improving the precision of various measurements and/or increasing the center-of-mass energy represent key avenues to extend our knowledge at the smallest subatomic scales. This is precisely what the future accelerators try to develop, ranging from near futur projects to long-term plans.

This internship project focuses on top quarks production in electron-positron collisions, in the context of the Future Cicular Collider (FCC) project. Studying the production cross-section as function of the center-of-mass energy, including non perturbative effects, would be the first goal of the internship. In a second step, impact of detector effectson both total cross-section and kinematic distributions, could be probed. If time allows, the impact of new interactions on top quark physics could be studied in the context of an Effective Field Theory extending the SM.

Basic knowledge in particle physics is required and an experience in experimental particle physics would be an asset. Some basics in C++ and/or python and the analysis software ROOT are welcome.