

Linear Collider Facility - Physics about $t\bar{t}$ threshold and outlook

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At energies above 500 GeV processes such as di-Higgs production or associated top-Higgs production open up. Both processes will profit from the clean environment of e^+e^- collisions that will allow for a direct measurement of the Higgs self-coupling and an unambiguous determination of the CP properties of the Higgs boson.

The Higgs particle is intimately coupled to the top quark. Therefore, the full top programme can be considered as equally important to that of the Higgs. In the past years French groups made leading contributions to this topic. The top quark programme will cover a precise determination of the top quark mass as well as of the electroweak top quark couplings to the percent precision. Deviations from the Standard Model prediction would allow for interpretations in the frame of models with (warped) extra dimensions or (equivalent) models in which the Higgs and the top are composite. These measurements will be complemented by the determination of electroweak couplings of lighter Standard Model fermions in the per-mille range that in itself bears a considerable discovery potential. Finally, it will be also outlined how the energy reach of linear colliders is capable to complement discoveries that might be made in the upcoming HL-LHC phase.

The most mature proposal for a linear collider is the International Linear Collider ILC based on superconducting radio frequency (SCRF) cavities. Therefore, the physics potential will be mainly illustrated by recent results obtained in detailed simulation studies using the detector concepts ILD and SiD. These results are complemented by results obtained in studies for CLIC and where available for other linear collider variants. Recently, all variants are federated under the roof of the LCVision project that will allow for elaborating a coherent plan for the initial stage of a Linear Collider Facility and for the upgrades to higher energies.

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