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Optimising top-quark pair-production threshold scan at future e^+e^- colliders

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One of the main goals of the future e^+e^- colliders is to measure the top-quark mass and width in a scan of the pair production threshold. Yet, the shape of the threshold cross section depends also on other model parameters as the top Yukawa coupling and the strong coupling constant. We study the expected precision of the top-quark mass determination from the threshold scan at CLIC, ILC and FCCee. We use the most general fit approach with all relevant model parameters and expected constraints from earlier measurements taken into account. We demonstrate that even in the most general approach the top-quark mass can be extracted with statistical precision of the order of 20 to 30 MeV. Additional improvement is possible if the running scenario is optimized. We propose the optimisation procedure based on the genetic algorithm. When optimising the mass measurement the statistical uncertainty can be reduced by about 30%, corresponding to factor of 2 increase in the integrated luminosity.

Secondary track (number)

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