



Contribution ID: 41

Type: Oral presentation using Zoom

## Optimising top-quark threshold scan using genetic algorithm

*Wednesday, 27 October 2021 16:42 (20 minutes)*

One of the important goals at the future  $e^+e^-$  colliders is to measure the top-quark mass and width in a scan of the pair production threshold. However, the shape of the pair-production cross section at the threshold depends also on other model parameters, as the top Yukawa coupling, and the measurement is a subject to many systematic uncertainties. Presented in this work is the study of the top-quark mass determination from the threshold scan. The most general approach is used with all relevant model parameters and selected systematic uncertainties included in the fit procedure. Based on the procedure developed for CLIC, results assuming the ILC luminosity spectra are presented. Expected constraints from other measurements are also taken into account. It is demonstrated that the top-quark mass can be extracted with precision of the order of 30 to 40 MeV, including considered systematic uncertainties, already for 100 fb<sup>-1</sup> of data collected at the threshold. Additional improvement is possible, if the running scenario is optimised. With the optimisation procedure based on the genetic algorithm the statistical uncertainty of the mass measurement can be reduced by about 25%. Influence of the collider luminosity spectra on the expected precision of the measurement is also studied.

### 1st preferred time slot for your oral presentation

19:00-21:00 JST (12:00-14:00 CEST, 6:00-8:00 EDT, 3:00-5:00 PDT)

### 2nd preferred time slot for your oral presentation

15:30-17:30 JST (8:30-10:30 CEST, 2:30-4:30 EDT, 23:30-1:30 PDT)

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**Session Classification:** G: Top / Heavy flavour / QCD

**Track Classification:** Parallel sessions: Topical Groups: Session G: Top / Heavy flavour / QCD