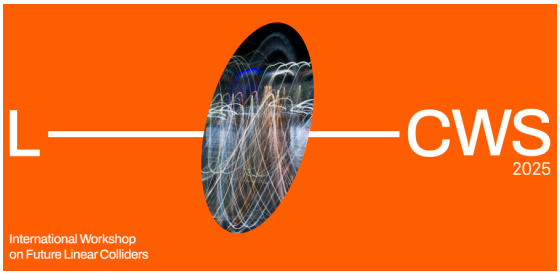

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Determination of the first-generation quark couplings at the Z-pole

Thursday 23 October 2025 10:10 (15 minutes)

Electroweak Precision Measurements are stringent tests of the Standard Model and sensitive probes to New Physics. Accurate studies of the Z-boson couplings to the first-generation quarks, which are currently only constrained from LEP data, could reveal potential discrepancies from the theory predictions. Future colliders running at the Z-pole would be an excellent tool for an analysis based on a comparison of radiative and non-radiative Z boson decays.

We present the corresponding method to extract the values of the couplings to light quarks and discuss the uncertainty of the measurement, including contributions from various systematic effects. We show that systematic uncertainty in the heavy-flavour tagging performance is the key factor in the analysis and reducing it to a sub-permille level might be crucial to fully profit from the high luminosity of future machines. In such a case, the measurement could improve the LEP results by at least an order of magnitude.

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