

Dispersive determination of Higgs boson mass

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We demonstrate that the Higgs boson mass can be extracted from the dispersion relation obeyed by the correlation function of two b-quark scalar currents. The solution to the dispersion relation with the input from the perturbative evaluation of the correlation function up to next-to-leading order in QCD and with the b quark mass $m_b = 4.43$ GeV demands a specific Higgs mass 115_{-9}^{+13} GeV. Our observation offers an alternative resolution to the long-standing fine-tuning problem of the Standard Model (SM): the Higgs mass is determined dynamically for the internal consistency of the SM. The similar formalism leads to the Z boson mass 90.8 GeV and the top quark mass 177 GeV. It is highly nontrivial to predict the above electroweak mass scales with at most 8% deviation from the measured values using the single parameter m_b .

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