

CDF II W-mass anomaly faces first-order electroweak phase transition

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We suggest an appealing strategy to probe a large class of scenarios beyond the Standard Model simultaneously explaining the recent CDF II measurement of the W boson mass and predicting first-order phase transitions (FOPT) testable in future gravitational-wave experiments. Our analysis deploys measurements from the gravitational waves channels and high energy particle colliders. We discuss this methodology focusing on the specific example provided by an extension of the Standard Model of particle physics that incorporates an additional scalar $SU(2)_L$ triplet coupled to the Higgs boson. We show that within this scenario a strong electroweak FOPT is naturally realised consistently with the measured W boson mass-shift. This model can be tested in future space-based interferometers such as LISA, DECIGO, BBO, TianQin, TAIJI projects and in future colliders such as FCC, ILC, CEPC.

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