Contribution ID: **23** Type: **not specified**

Vector-like Quark B Bounds at the LHC: Impact of THDM-II

Wednesday, September 24, 2025 5:00 PM (15 minutes)

We examined the integration of vector-like bottom (VLB) quarks into the Two-Higgs-Doublet Model (THDM), enabling new decay channels distinct from the Standard Model (SM) processes ($B \to Zb$, $B \to hb$, $B \to Wt$). These Beyond Standard Model (BSM) decays, including CP-even $B \to Hb$, CP-odd $B \to Ab$, and charged $B \to H^- t$ modes, remain unprobed at the LHC, where VLB searches currently target only SM channels. Our analysis assessed the impact of these BSM decays on the stringent mass constraints for VLB quarks in THDM type II (THDM-II) under the alignment limit. For a singlet B, the mass limit drops from approximately 1.43 TeV to 1.00 TeV, while for a doublet (T, B), it decreases from about 1.55 TeV to 0.98 TeV, driven primarily by the $T \to H^- b$ decay, which can achieve a branching ratio of nearly 100%.

Primary authors: Dr BOUKIDI, Mohamed (Polydisciplinary Faculty, Laboratory of Physics, Energy, Environment, and Applications, Cadi Ayyad University, Sidi Bouzid, B.P. 4162, Safi, Morocco); Mr ECH-CHAOUY, Mohamed (Polydisciplinary Faculty, Laboratory of Physics, Energy, Environment, and Applications, Cadi Ayyad University, Sidi Bouzid, B.P. 4162, Safi, Morocco); Prof. BENBRIK, Rachid (Polydisciplinary Faculty, Laboratory of Physics, Energy, Environment, and Applications, Cadi Ayyad University, Sidi Bouzid, B.P. 4162, Safi, Morocco); Prof. MORETTI, Stefano (Department of Physics & Astronomy, Uppsala University, Box 516, SE-751 20 Uppsala, Sweden.); Ms SALIME, khawla (Polydisciplinary Faculty, Laboratory of Physics, Energy, Environment, and Applications, Cadi Ayyad University, Sidi Bouzid, B.P. 4162, Safi, Morocco)

Presenter: Ms SALIME, khawla (Polydisciplinary Faculty, Laboratory of Physics, Energy, Environment, and Applications, Cadi Ayyad University, Sidi Bouzid, B.P. 4162, Safi, Morocco)

Session Classification: Parallel 4

Track Classification: Parallel