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**A Combined Search for Pair-Produced Bottom-Type Vector-Like Quarks in 13 TeV  $pp$  Collisions Using CMS Data**<sup>1</sup> NOAH PALADINO, Rutgers University, New Brunswick, CMS COLLABORATION COLLABORATION —

We describe the extension and combination of previous searches for the production of a pair of bottom-type vector-like quarks (VLQs) for masses above the current exclusion limit of  $900 \text{ GeV}/c^2$  in data gathered by the CMS detector during the 13 TeV runs in 2016, 2017, and 2018 of the Large Hadron Collider at CERN. We study hypothesized events where each VLQ decays to a bottom quark and Higgs/ $Z$  boson or to a top quark and  $W$  boson. We consider the cases where the Higgs/ $Z/W$  boson decays into two quarks, which are typically resolved as two jets but can merge together as one jet when the Higgs/ $Z/W$  boson has a high transverse momentum. In the decay to  $tW$ , we consider events where the top quark is resolved as one, two, or three jets. For decays to  $bHbZ$  and  $bZbZ$  we consider decays of the  $Z$  boson to two leptons of the same flavor and opposite charge. Using a  $\chi^2$  metric based on the reconstructed mass of the Higgs/ $Z/W$  boson and top quark, as well as jet-level quark tagging, significantly reduces background from Standard Model processes. We present the expected exclusion limits set from the combination of the fully-hadronic and dileptonic analyses run over  $137 \text{ fb}^{-1}$  of integrated luminosity data collected by the CMS detector during Run II.

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