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Low-mass doubly charged Higgs bosons at the LHC

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Search for light (within the mass range 84–200 GeV) doubly-charged Higgs bosons decaying into a pair of W -bosons has been deemed challenging using the conventional LHC searches with leptons, jets and missing transverse momentum in the final state. Such Higgses together with slightly heavier singly-charged and neutral Higgses, when arranged in an $SU(2)_L$ triplet as in the type-II see-saw model, are lately shown to accommodate the recent measurement of the W -boson mass by the CDF collaboration. These, when produced in a highly Lorentz-boosted regime, tend to manifest themselves as a single fat-jet or a pair of adjacent same-sign leptons plus missing transverse momentum. First, we perform a multivariate analysis to discern such exotic jets from the SM jets. Then, we present a novel search in the final state with an exotic jet and two same-sign leptons plus missing transverse momentum. We find that such low-mass doubly-charged Higgses could be directly probed with the already collected Run 2 LHC data.

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