

## Possible Search for Doubly-Charged Bileptons

In the over six years since the discovery of the BEH boson in July 2012 no additional particle has been discovered at the LHC. It would be revolutionary to be able to do so. With the apparent demise of TeV scale SUSY or LED, the most likely extension of the Standard Model is regarded by some as the Bilepton Model discussed in [1], characterised by doubly-charged gauge bosons  $Y^{\pm\pm}$  which may be thought of as siblings of the well-known weak interaction intermediaries  $W^\pm$  and which decay into like-sign lepton pairs. These bileptons must be pair-produced  $Y^{++}Y^{--}$  and hence the final state must contain  $(e^+e^+)(e^-e^-)$ ,  $(\mu^+\mu^+)(\mu^-\mu^-)$ , or  $(\tau^+\tau^+)(\tau^-\tau^-)$ . At the LHC, bilepton signatures appear by plotting the differential cross-section versus the maximum transverse momentum of any of the charged leptons,  $P_{T,max}$  or alternatively versus the pseudorapidity. Such plots are shown in Fig.(5a) and Fig.(5b) respectively in [1]. In both cases the bilepton signal can be recognised clearly above the Standard Model background. The Bilepton Model is constructed using the same principles as, and subsumes, the Standard Model within a renormalizable gauge field theory. It predicts that the bilepton mass be below 2 TeV and explains by anomaly cancellation the occurrence of three families.

## References

- [1] G. Corcella, C. Corianò, A. Costantini and P.H. Frampton, Phys. Lett. **B773**, 544 (2017).