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Characterising the 750 GeV diphoton excess

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We study kinematic distributions that may help characterise the recently observed excess in diphoton events at 750 GeV at the LHC Run 2. Several scenarios are considered, including spin-0 and spin-2 750 GeV resonances that decay directly into photon pairs as well as heavier parent resonances that undergo three-body or cascade decays. We find that combinations of the distributions of the diphoton system and the leading photon can distinguish the topology and mass spectra of the different scenarios, while patterns of QCD radiation can help differentiate the production mechanisms. Moreover, missing energy is a powerful discriminator for the heavy parent scenarios if they involve (effectively) invisible particles. While our study concentrates on the current excess at 750 GeV, the analysis is general and can also be useful for characterising other potential diphoton signals in the future.

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