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Bounds from LEP on unparticle interactions with electroweak bosons

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A conformally invariant hidden sector is considered, with a scalar operator O of low dimension that couples to the electroweak gauge bosons of the standard model, via terms such as $F_{\mu\nu} F_{\mu\nu} O$. By examining single photon production at LEP, we bound the strength of these interactions. We apply our results, along with those of Delgado and Strassler [A. Delgado and M.J. Strassler, Phys. Rev. D 81, 056003(2010).] and of Caracciolo and Rychkov [F. Caracciolo and S. Rychkov, Phys. Rev. D 81, 085037 (2010).], to improve the bound on 4γ production through “unparticle self-interactions,” as proposed by Feng et al. [J.L. Feng, A. Rajaraman, and H. Tu, Phys. Rev. D 77, 075007 (2008).]. We find the maximum allowable cross section is of order a few tens of femtobarns at the 14 TeV LHC, and lies well below 1 fb for a wide range of parameters.

Presenter: Mr KNAPEN, Simon Knapen (Rutgers, the state university of New Jersey)

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