



Contribution ID: 177

Type: not specified

## Interpreting the 750 GeV diphoton signal as technipion

Wednesday, April 13, 2016 4:30 PM (15 minutes)

We discuss a scenario in which the enhancement in the diphoton final state at  $M_{\gamma\gamma} = 750$  GeV, recently observed by the ATLAS and CMS collaborations, is a technipion. We consider two different detailed minimal scenarios. In a first one (vector-like technicolor model) we assume that the vector-boson fusion is a dominant production mechanism. In a second one (one family walking technicolor model) the technipion is produced dominantly by the gluon-gluon fusion. We adjust parameters of the model (coupling constant) to the size of the signal at  $\sqrt{s} = 13$  TeV and discuss the size of the signal at lower energies (LHC, Tevatron) for  $\gamma\gamma$  and jet-jet final states, where it was not observed and check consistency with the existing data. The signal is compared with the background diphoton contributions. As background contributions we include  $q\bar{q}$  annihilation, gluon-gluon fusion via quark boxes, as well as photon-photon fusion via lepton, quark and  $W$ -bosons boxes. In the latter case (background) as well as for the technipion production (signal) we include elastic-elastic, elastic-inelastic, inelastic-elastic and inelastic-inelastic photon-photon processes, where "inelastic" means associated e.m. dissociation of a proton. In both cases we observe the dominance of inelastic-inelastic processes. We consider also an alternative partonic approach with  $2 \rightarrow 3$  subprocess (with off-shell photons) and compare it to the approach with on shell photons. We predict the signal cross section for purely exclusive  $pp \rightarrow pp\gamma\gamma$  processes at  $\sqrt{s} = 13$  TeV to be about 0.5 fb. Such a cross section would be measurable with integrated luminosity about  $20 \text{ fb}^{-1}$ . In all considered cases (other experiments) the signal is below the background or/and below the threshold set by statistics although some tension can be seen. The presentation will be based on our upcoming paper [1].

[1] P. Lebiedowicz, M. Łuszczak, R. Pasechnik and A. Szczurek, a paper in preparation.

**Primary author:** Prof. SZCZUREK, Antoni (Institute of Nuclear Physics PAN, Krakow and Rzeszow University, Rzeszow)

**Co-authors:** Dr LUSZCZAK, Marta (Rzeszow University, Rzeszow); Dr LEBIEDOWICZ, Piotr (Institute of Nuclear Physics PAN, Krakow); Dr PASECHNIK, Roman (Lund University, Sweden)

**Presenter:** Prof. SZCZUREK, Antoni (Institute of Nuclear Physics PAN, Krakow and Rzeszow University, Rzeszow)

**Session Classification:** WG3 Electroweak Physics and Beyond the Standard Model

**Track Classification:** Electroweak Physics and Beyond the Standard Model