Contribution ID: **177** Type: **not specified**

Interpreting the 750 GeV diphoton signal as technipion

Wednesday 13 April 2016 16:30 (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 $2 \to 3$ subprocess (with off-shell photons) and compare it to the approach with on shell photons. We predict the signal cross section for purely exclusive $pp \to pp\gamma\gamma$ procesess at $\sqrt{s}$ = 13 TeV to be about 0.5 fb. Such a cross section would be measurable with integrated luminosity about 20 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. {\L}uszczak, 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