



Contribution ID: 304

Type: parallel talk

## Probing Top Quark with Diphoton at Hadron Colliders

Monday, 8 May 2017 15:30 (15 minutes)

Any particle that is charged under  $SU(3)_C$  and  $U(1)_{EM}$  can mediate the  $gg \rightarrow \gamma\gamma$  process through loops. Near the threshold for the particle pair production, gauge boson exchanges necessitate the resummation of ladder diagrams. We discuss the leading log order matching of the one-loop result with non-relativistic effective theory resummed result. We show how the diphoton invariant mass spectrum varies depending on decay width, color representation and electric charge of the particle. The exclusion limits on the product of  $SU(3)_C$  and  $U(1)_{EM}$  charges of the new scalar or fermion particle are obtained from current LHC data. In addition, we apply the same method to the top quark to discuss its observation and mass measurement in the diphoton channel in hadron colliders.

### Summary

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**Session Classification:** Top