

Abstract Submitted  
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**Measuring the CP nature of the Higgs-tau Yukawa coupling** MOHAMMAD HASSAN HASSANSHAHI, Imperial College London, CMS COLLABORATION — One of the predictions of the Standard Model is that the Higgs boson is even under charge-parity inversion. In this study, we discuss the first direct measurement of the CP nature of the Yukawa coupling between the Higgs boson and tau leptons which is performed on the  $H \rightarrow \tau\tau$  events. The analysis is based on a p-p collision data set corresponding to  $137\text{fb}^{-1}$  integrated luminosity recorded by the CMS experiment at CERN during 2016-2018. This is a combined analysis of the  $\mu\tau_h$  and  $\tau_h\tau_h$  final states in which  $\tau_h$  shows the decay of a tau to hadron(s). The angle between the two planes spanned by each of the tau decays is sensitive to the CP of the coupling. Different optimizations are performed to increase the CP sensitivity while retaining enough statistics. The result disfavors a pure CP-odd coupling by 3.2 standard deviations.

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