

# Measurements of Higgs boson properties in decays to two tau leptons with the ATLAS detector

Tuesday, November 8, 2022 11:10 AM (15 minutes)

This talk will present a measurement of the charge conjugation and parity ( $CP$ ) properties in the Higgs boson interaction with  $\tau$  leptons. The Yukawa interaction is generalized with a single mixing angle parameter  $\phi_\tau$  to describe  $CP$ -odd interactions between the Higgs boson and  $\tau$  leptons. The study is based on a measurement of  $CP$ -sensitive angular observables defined by the visible decay products of  $\tau$  lepton decays, performed using a data sample corresponding to  $139 \text{ fb}^{-1}$  of proton-proton collisions recorded at a center-of-mass energy of  $\sqrt{s} = 13 \text{ TeV}$  with the ATLAS detector at the Large Hadron Collider. Without assuming Standard Model hypothesis for the  $H \rightarrow \tau\tau$  signal strength, the mixing angle  $\phi_\tau$  is measured to be  $9 \pm 16^\circ$ , with an expected value of  $0 \pm 28^\circ$  at the 68% confidence level. The pure  $CP$ -odd hypothesis is disfavoured at 3.4 standard deviations. The results are compatible with the predictions for the Higgs boson in the Standard Model as well as  $CP$ -violating scenarios.

## Type of talk

Experimental measurements

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**Session Classification:** Tuesday Session A

**Track Classification:** Physics Topics: Yukawa