

DIS2023: XXX International Workshop on Deep-Inelastic Scattering and Related Subjects



Contribution ID: 12

Type: **Parallel talk**

Search for off-shell production of the Higgs boson and measurement of its total width with the ATLAS experiment

Tuesday, 28 March 2023 09:00 (20 minutes)

A search for off-shell production of the Higgs boson using 139 fb^{-1} of pp collision data at $\sqrt{s} = 13 \text{ TeV}$ collected by the ATLAS detector at the Large Hadron Collider. The observable signature is a pair of on-shell H bosons, with contributions both from the virtual Higgs boson and interference with other processes, and the two decay final states, $\text{H}\text{H} \rightarrow 4\ell$ and $\text{H}\text{H} \rightarrow 2\ell 2\tau$ with $\ell = \mu$ or e . The background-only hypothesis is rejected with an observed (expected) significance of 3.2 (2.4) σ , which marks the experimental evidence of off-shell Higgs production. The observed (expected) upper limit on the signal strength, defined as the event yield normalised to the Standard Model prediction is 2.3 (2.4) at a 95% confidence level, which restricts the total width of the Higgs boson to be less than 9.7 (10.2) MeV at the same confidence level. Besides, the off-shell Higgs ($220 \text{ GeV} < m_{\text{H}} < 2000 \text{ GeV}$) provides a pivotal window to search for BSM hints. The corresponding EFT interpretations for Higgs-gluon and Higgs-top quark interactions are also provided.

Submitted on behalf of a Collaboration?

Yes

Participate in poster competition?

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Session Classification: WG3

Track Classification: WG3: Electroweak Physics and Beyond the Standard Model