7. Higgs Physics

7.4 Current Status
Vector Bosons

**ATLAS** Preliminary

\( \gamma \gamma \), \( m_H = 125.09 \text{ GeV} \)

**CMS** Preliminary 2016 + 2017 + 2018

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Mass Measurements

![Graph showing mass measurements for ATLAS and CMS in 7 TeV, 8 TeV, and 13 TeV]

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Fermions Couplings

CMS Preliminary

$137 \text{ fb}^{-1} (13 \text{ TeV})$

- Obs.
- $\tau\tau$ bkg.
- $Z \rightarrow ee/\mu\mu$
- $t\bar{t}$ + jets
- $\tau$ mis-ID
- Others
- Unc.
- $H \rightarrow \tau\tau$ ($\mu = 0.85$)

(S/B)-weighted events / GeV

$137 \text{ fb}^{-1} (13 \text{ TeV})$

CMS

All categories

$S/(S+B)$ weighted

$m_h = 125.38 \text{ GeV}$

- Data
- $S+B$ ($\mu=1.19$)
- Bkg. component
- $\pm 1 \sigma$
- $\pm 2 \sigma$

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Higgs Couplings

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Summary

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**Measured:** mass, $J^C_P$, couplings to $Z$, $W$, $t$, $b$, , and

**Open:** coupling to light quarks and electrons, coupling to itself

**More open questions:** are there more Higgs bosons? will improved precision reveal new physics? are there non-SM decays? ...