



南京大學
NANJING UNIVERSITY



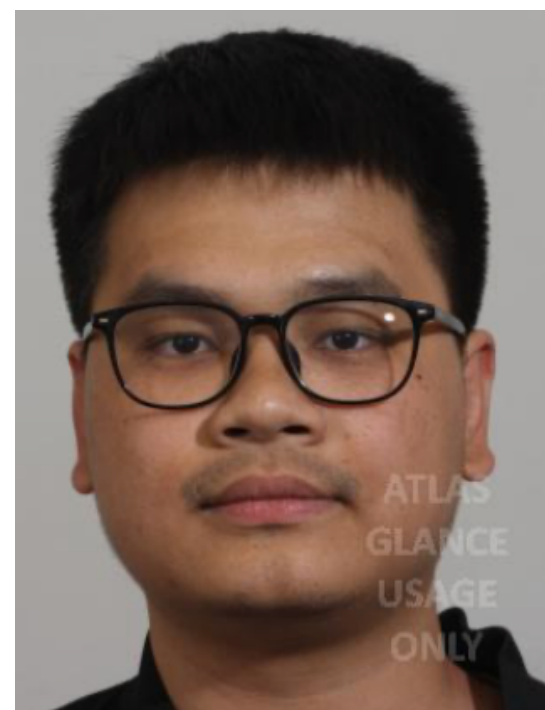
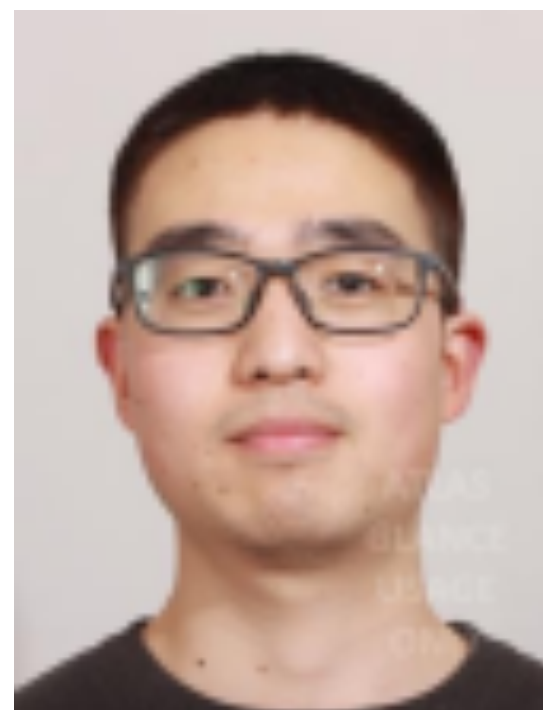
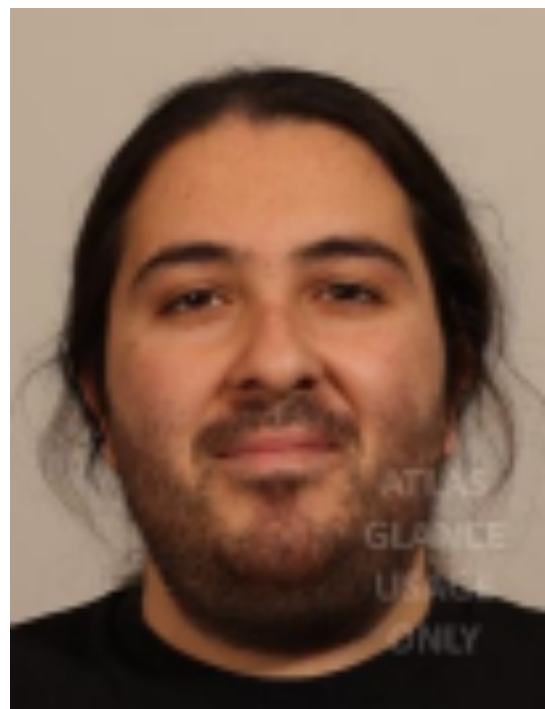
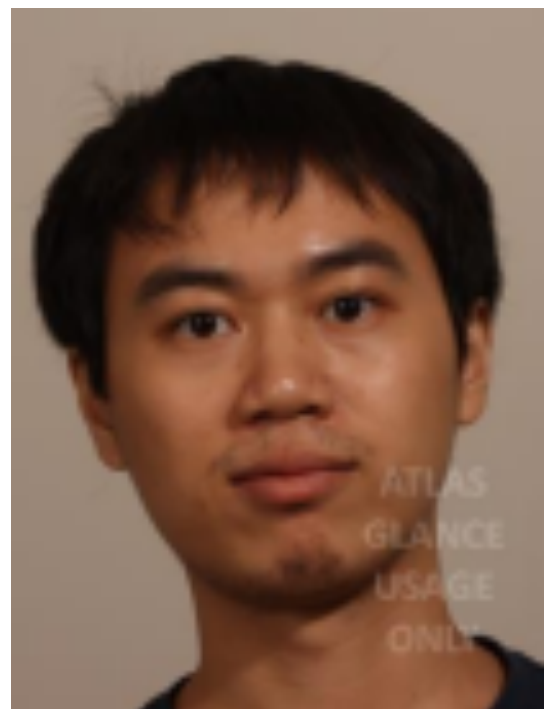
ATLAS highlights from Nanjing University in 2025

Rui Zhang

Nanjing University

ATLAS-China faculty meeting 2026

Overview of Nanjing ATLAS group



- ◉ Faculty: 金山(Shan Jin), 陈申见 (Shenjian Chen), 张雷(Lei Zhang), 闵天觉(Tianjue Min, no M&O), 夏力钢(Ligang Xia), 张瑞(Rui Zhang), 祁鸣(Ming Qi)
- ◉ Research stuff: Antonio Maria, Fabio Alves
- ◉ PostDoc: Liangliang Han (no M&O), Khanh Vu
- ◉ Students: 20+

+ students

Overview of OTP in 2025

- OTP in NJU-SYSU cluster

Year	Total OTP
2021	7.38
2022	7.88
2023	7.59
2024	7.69
2025	9.84
2026	0.83

Including SYSU's outsized contribution

Contribution highlights: Hardware

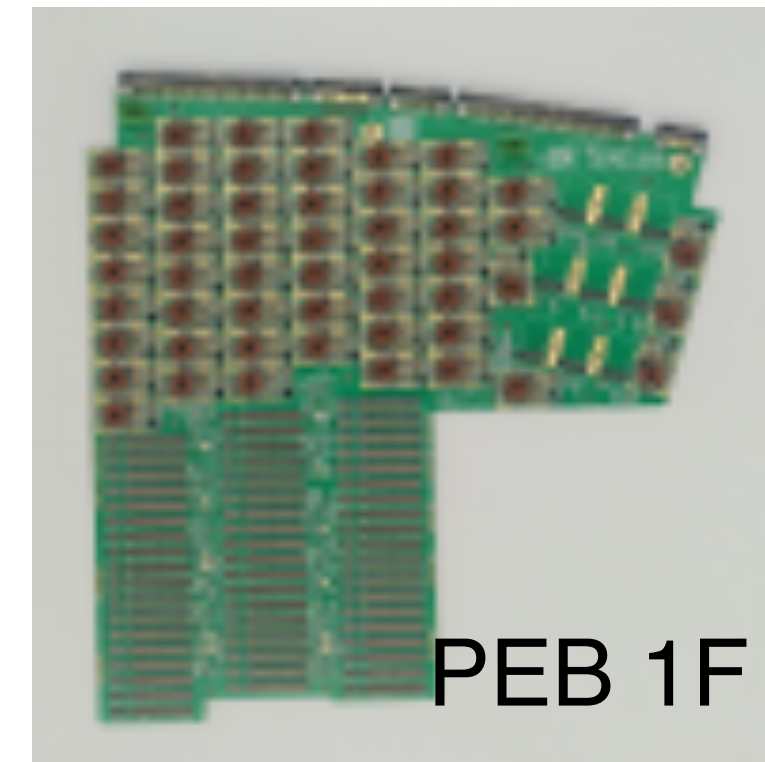
- Three labs in NJU

- ▶ Semi-conductor detector R&D and test
- ▶ Dark room for photon detector studies
- ▶ Education experiments
 - cosmic muon detection
 - cosmic microwave background measurement

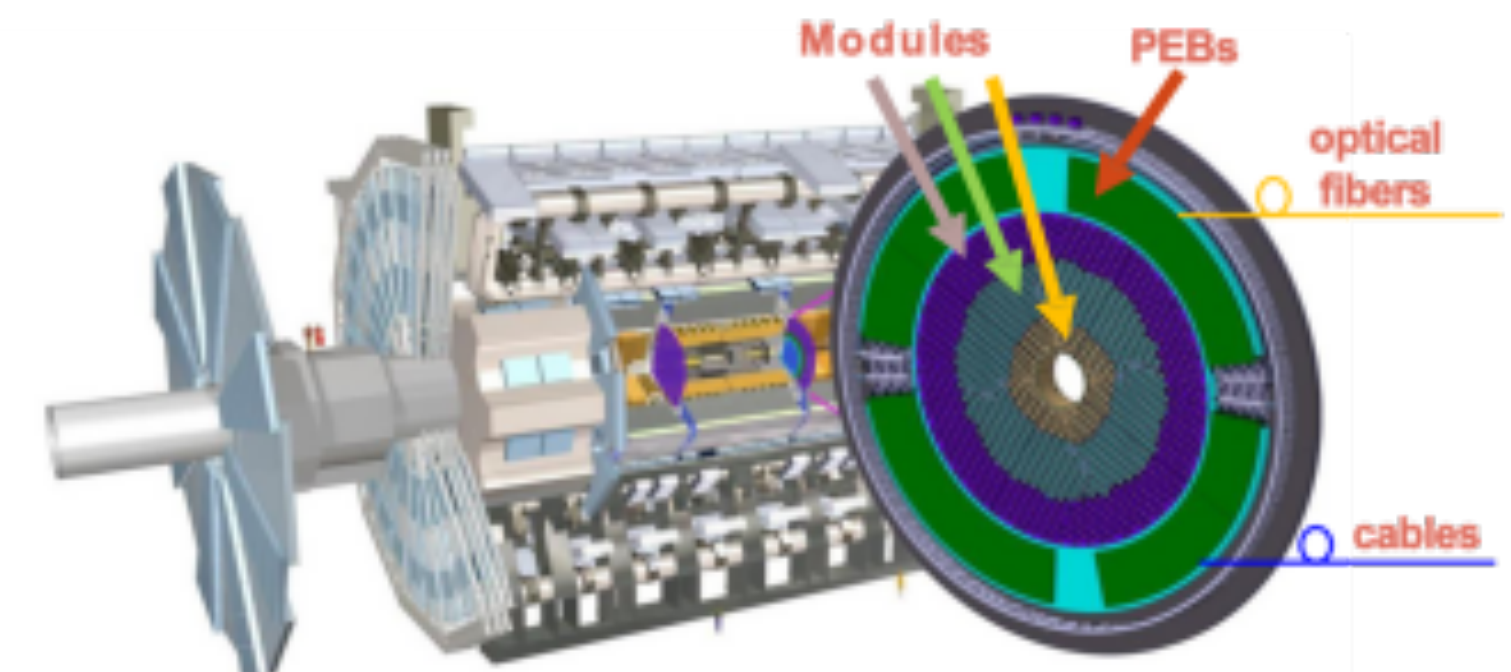


- HGTD project: PEB design, R&D and production

- ▶ HGTD provides precise time information (30-50 ps)
- ▶ PEB bridges the front-end modules and off-detector electronics
- ▶ Comprehensive tests performed
- ▶ Joint testing with HGTD demonstrator at CERN: Yimin, Weixi
- ▶ Closely collaborate with IHEP
- ▶ Final Design Review (FDR) in May 2025.



- Schematic design of other types like 3B is completed.



Contribution highlights: CP work

- ◉ **Combined Performance (CP): Tau**
 - L2 convener: Antonio Maria (2023-2025)
 - Physics validation: Antonio Maria
- ◉ **CP: Flavour tagging**
 - FTag software L3 convener: Ligang Xia (2023-2025)
 - Xbb tagging: Khanh Vu, Jinchao Zheng
- ◉ **CP: EGAM**
 - Photon ID: Zhanxiang Gao
 - e->photon fake rate: Yong Zhou
- ◉ **Simulation**
 - Fast calo sim L3 convener: Rui Zhang (2023-2027)

Contribution highlights: Analyses



Photons

- ◉ **H→Zγ Run2 + partial Run3** ([arXiv:2507.12598](https://arxiv.org/abs/2507.12598)): Zhanxiang, Fabio, Ligang, Shan
- ◉ **HH→bbyγ Run2 + partial Run3** ([Phys. Lett. B 876 \(2026\) 140280](https://arxiv.org/abs/2507.12598)): Zonghuan, Yixiang, Rui, Ligang, Shan
- ◉ **SH→bbyγ Run2 + partial Run3** ([arXiv:2510.02857](https://arxiv.org/abs/2510.02857)): Rui

Tau

- ◉ **VBF H→ττ CP** ([JHEP 10 \(2025\) 92](https://arxiv.org/abs/2507.12598)): Antonio
- ◉ **Boosted H→ττ Run2 + partial Run3**: Antonio (ed.)

b/c

- ◉ **VH H→bb+cc resolved+boosted** ([JHEP 04 \(2025\) 075](https://arxiv.org/abs/2507.12598)): Yuhao (INT ed.), Lei

RML

- ◉ **H→μμ Run2 + partial Run3 evidence** ([Phys. Rev. Lett. 135 \(2025\) 231802](https://arxiv.org/abs/2507.12598)): Zonghuan, Tianjue, Shan

Comb

- ◉ **H→VV CP Combination Run 2** ([arXiv:2603.20117](https://arxiv.org/abs/2603.20117)): Rui
- ◉ **European Strategy Update 2025** (ATL-PHYS-PUB-2025-018): Yizhou, Yimin, Rui, Lei
- ◉ **ATLAS+CMS HH combination Run2**: Yizhou (approval), Yimin (INT ed.), Khanh, Rui (contact), Lei, Shan

Contribution highlights: Analyses



diHiggs

- **HH→bb $\gamma\gamma$ Run3:** Zuofei, Yixiang, Shan
- **HH→bb $\tau\tau$ Run2 + partial Run3:** Yimin, Antonio, Lei
- **HH→bbbb Run2 + partial Run3:** Yizhou (INT ed.), Jinchao, Yuhui, Zonghuan, Tianjue, Fabio, Ligang, Rui, Lei
- **HH→bbll Run2 + partial Run3:** Fabio (**contact**), Shan
- **HH→multilepton Run2 + partial Run3:** Fabio, Yixiang

Comb

- **Higgs Legacy Combination Run 2:** Yuhao (**contact**), Fabio, Antonio, Yixiang, Rui, Shan

LFV

- **H→e τ / $\mu\tau$ Run3:** Antonio
- **H→ee/e μ Run3:** Rui
- Other single H analyses



Contribution highlights: Analyses



**Exo-
Signatures**

- **Heavy neutral lepton search Run2:** Weixi, Antonio, Lei
- **Semi-Visible jet + ISR photon Run 3:** Zhanxiang, Ligang, Shan

Umbrella

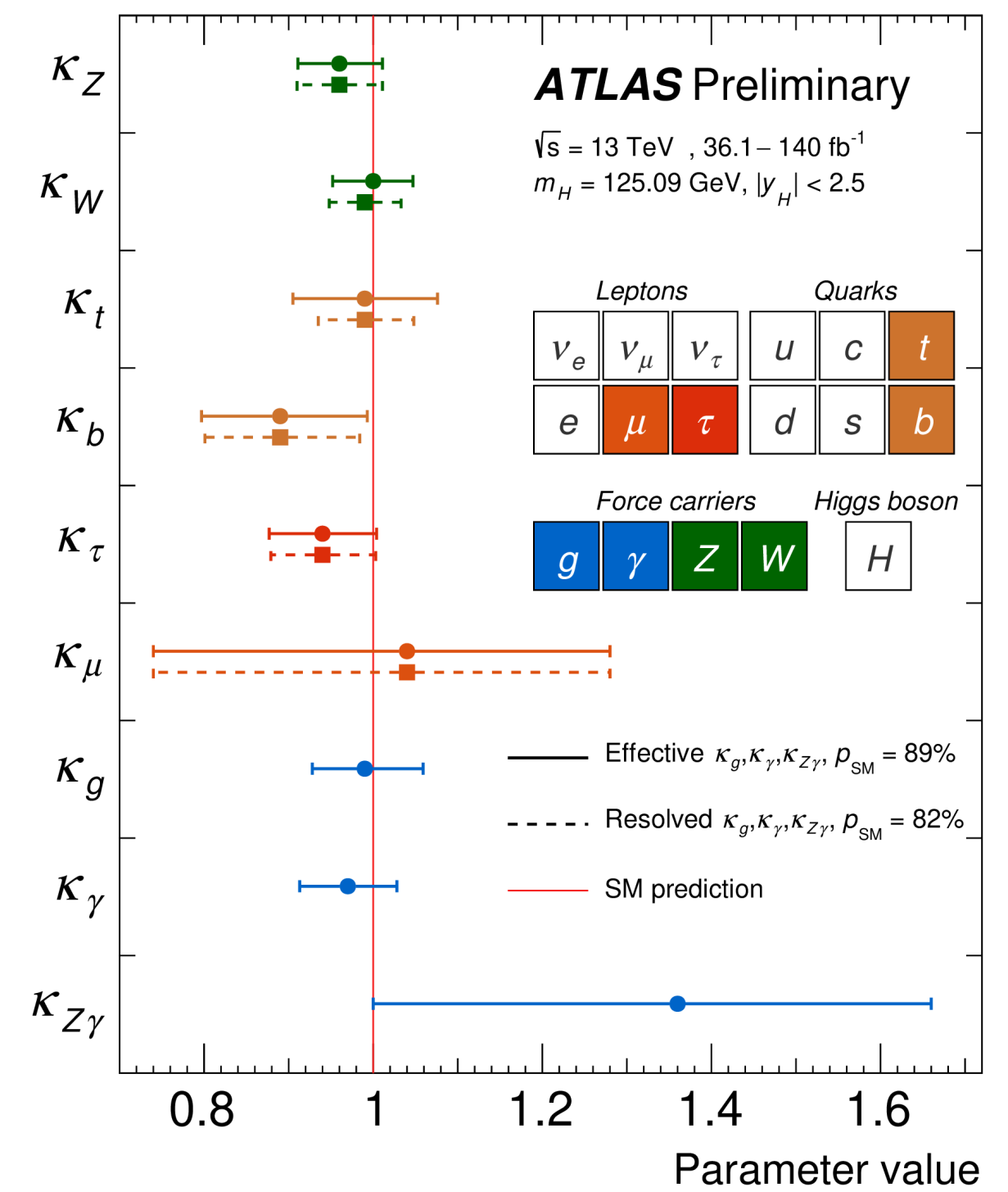
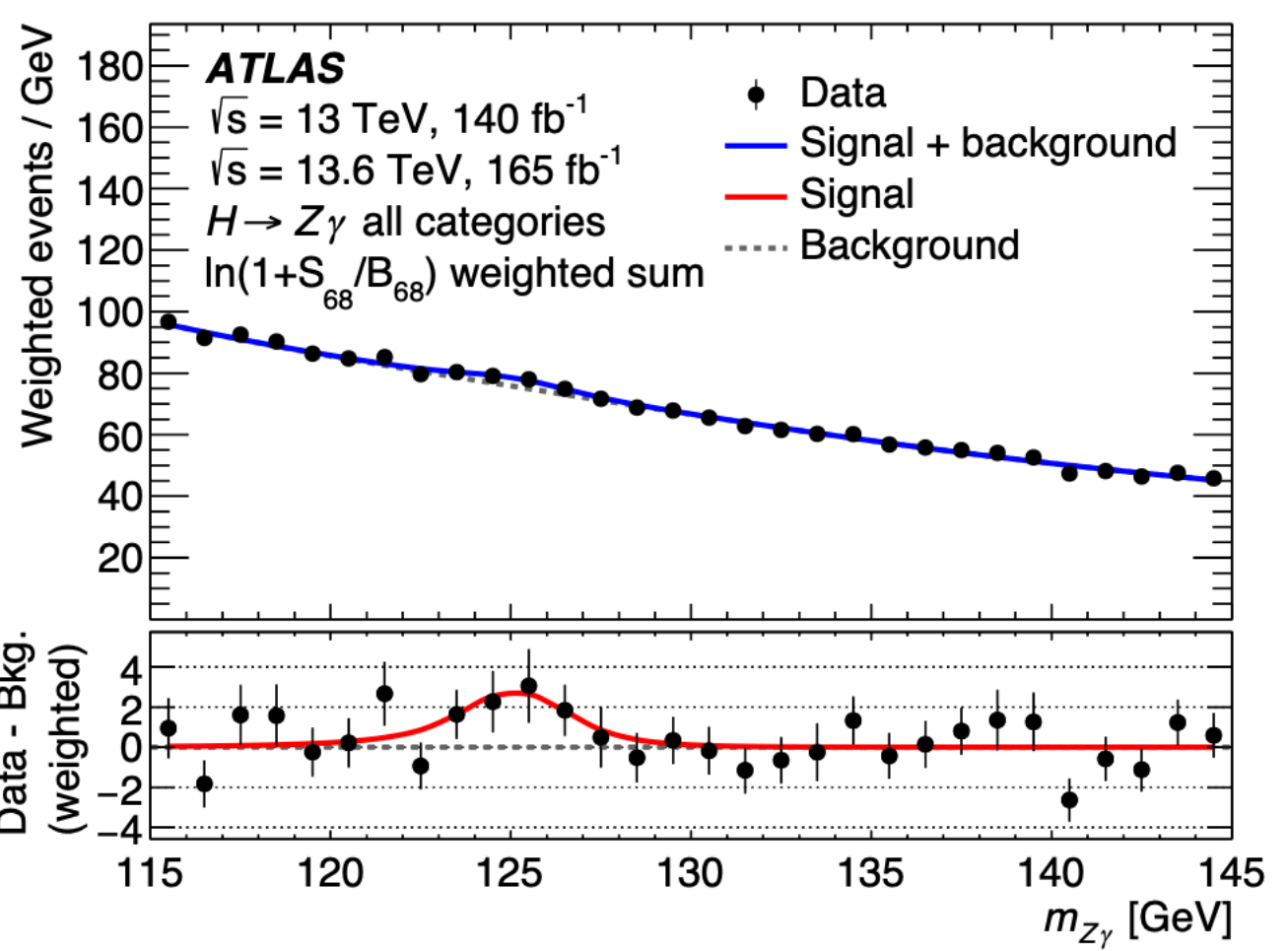
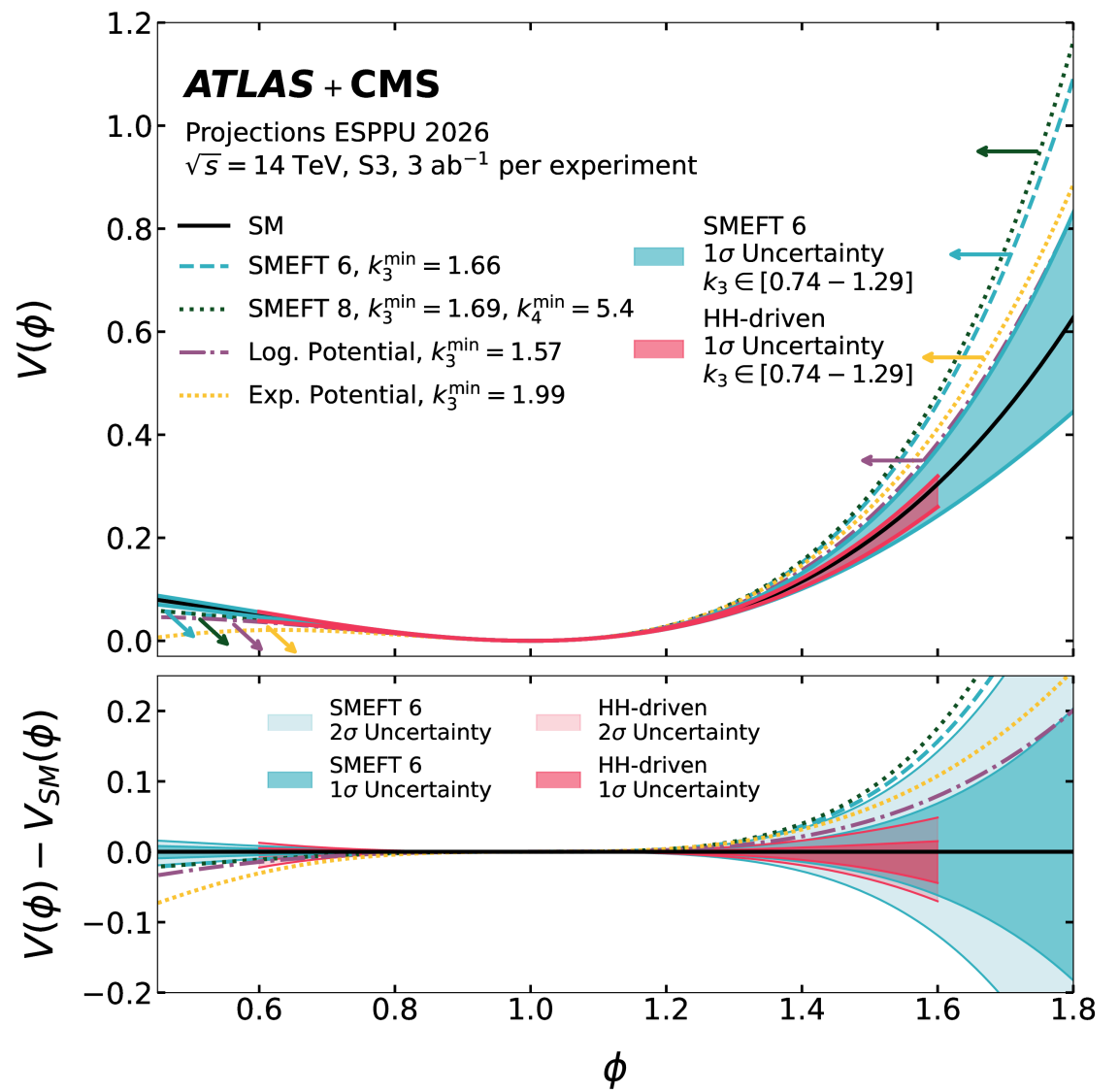
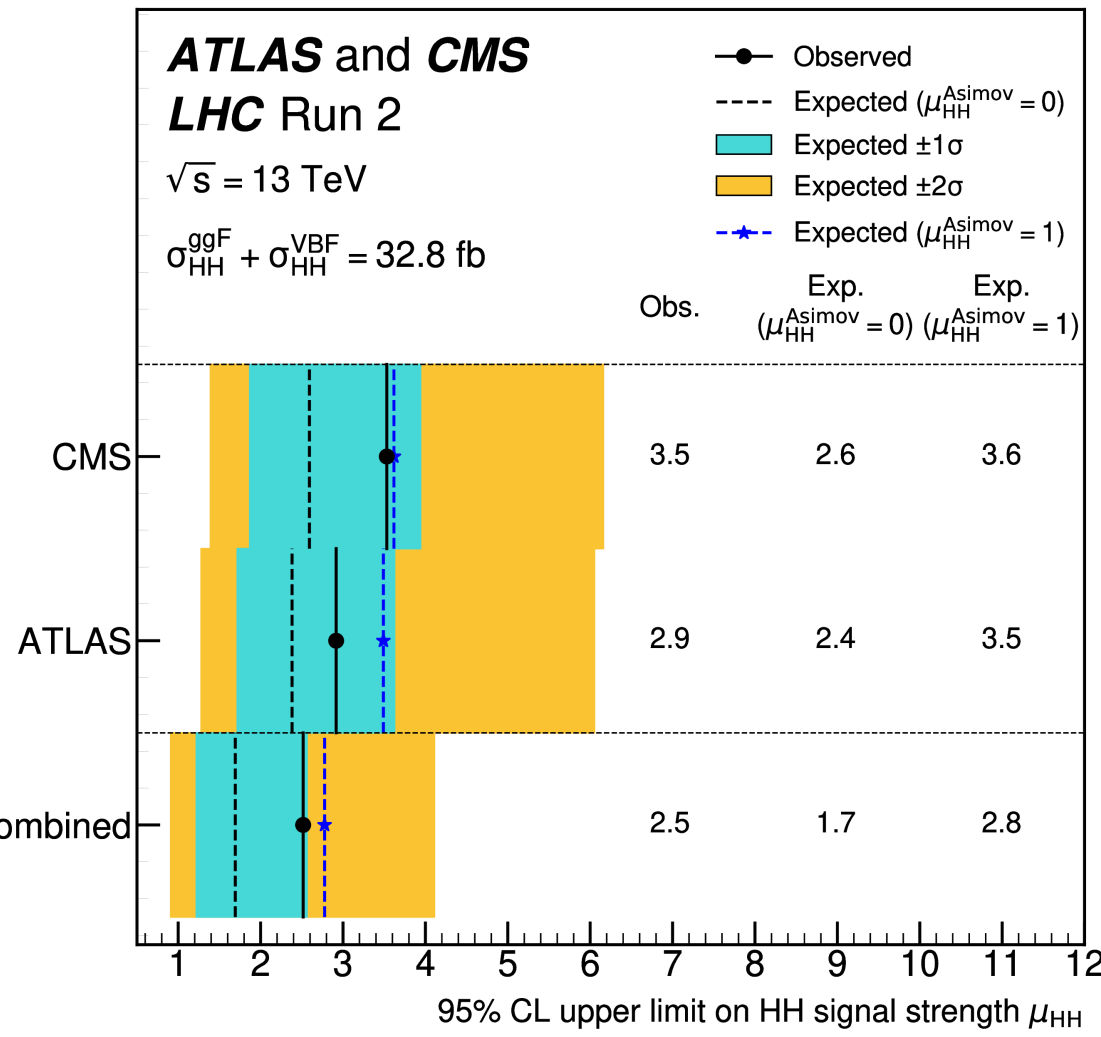
- **BSM search in $t\bar{t}$ final state Run3:** Jiawei, Zhanxiang, Ligang, Lei, Shan
- **BSM search in τ final state Run3:** Yimin, Weixi, Antonio

**Model
Independent**

- **Anomaly detection two body multi-trigger Run3:** Rui (contact)
- **Soft Unclustered Energy Patterns Run2:** Ligang



Gallery of published results in 2025

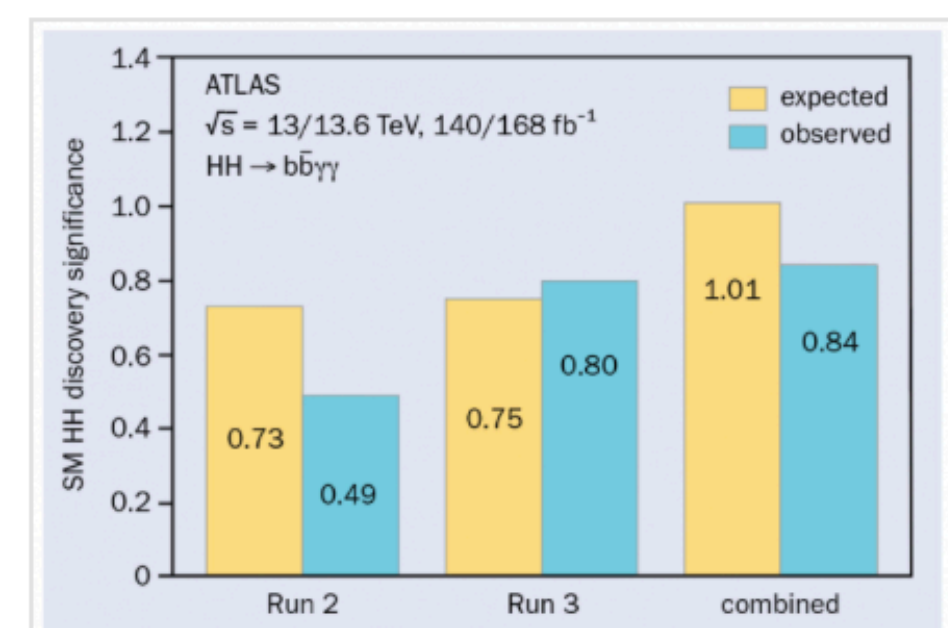


HIGGS AND ELECTROWEAK | NEWS

A step towards the Higgs self-coupling

7 November 2025

A report from the ATLAS experiment.



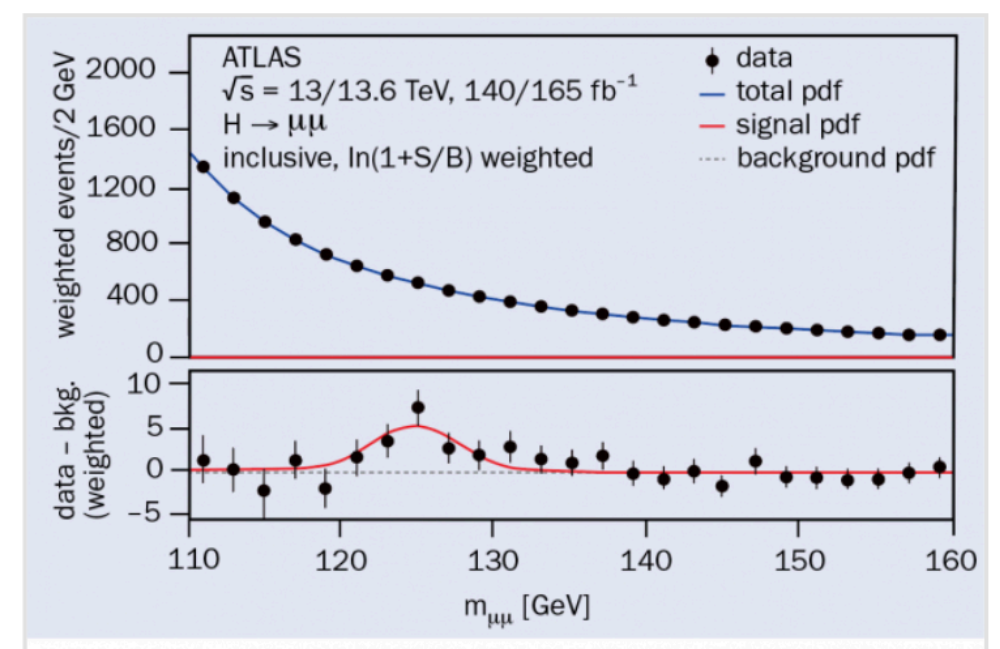
A defining yet unobserved property of the Higgs boson is its ability to couple to itself. The ATLAS collaboration has now set bounds on this interaction, by probing the rare production of Higgs-boson pairs. The self-coupling strength directly connects to the shape of the Higgs potential, a

HIGGS AND ELECTROWEAK | NEWS

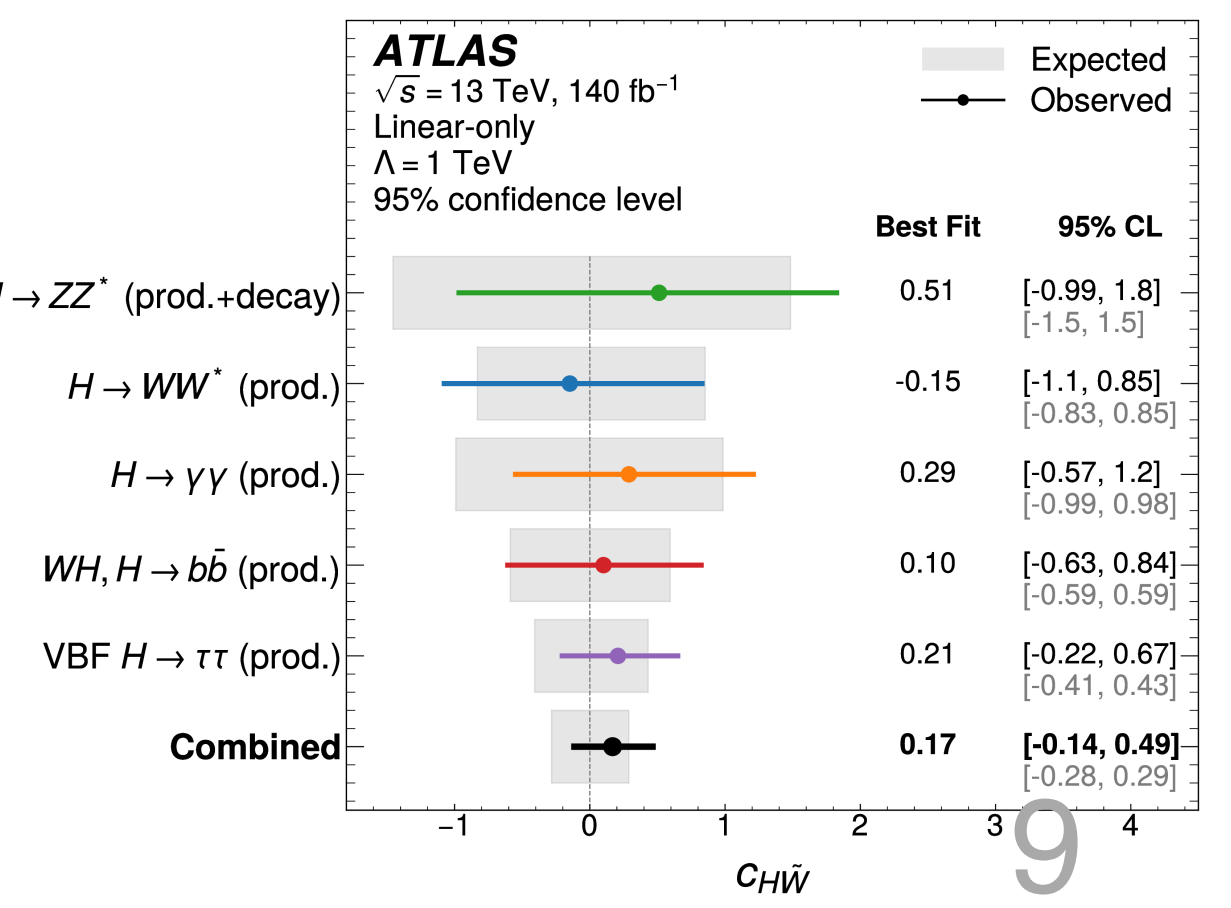
Mapping rare Higgs-boson decays

9 September 2025

A report from the ATLAS experiment.



Rare, unobserved decays of the Higgs boson are natural places to search for new physics. At the EPS-HEP conference, the ATLAS collaboration presented new improved measurements of two highly suppressed Higgs decays: into a pair of muons; and into a Z boson accompanied by a photon.



Future plan

- ◉ Hardware:
 - HGTD: PEB design, production, assembly at CERN
- ◉ Combined performance
 - Heavy flavour tagging
 - Tau performance
- ◉ Higgs self-coupling measurements
 - Partial Run 3, full Run 3
- ◉ Coupling between Higgs and heavy-flavour fermions
 - $H \rightarrow bb, cc, \tau\tau$, etc

*Thank
you!*