



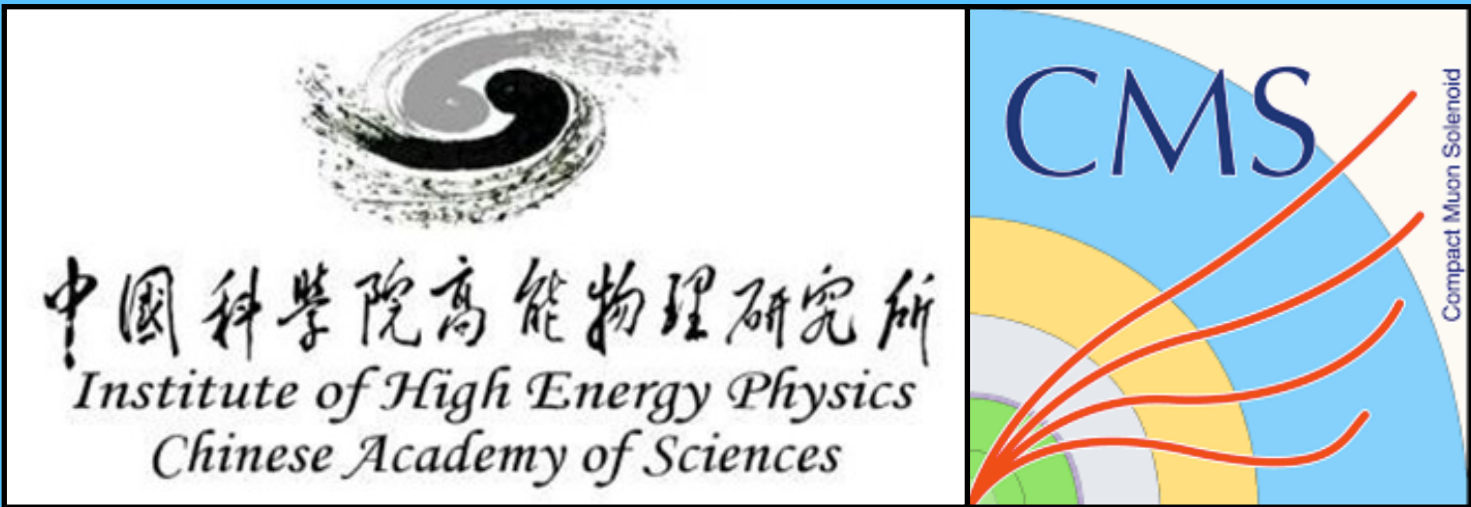
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9-12月考核

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非共振态双希格斯分析



- ▶ 通过 $WW\gamma\gamma$ 衰变道寻找双希格斯：
 - 本人于10月做了Approval 报告
 - 本分析结果已经通过CMS PAS发表
 - 相关结果汇报在Higgs 2022会议上
 - 未来会加入到HH combination中



CMS di-Higgs searches in final states with two photons

Chu Wang
Institute of High Energy Physics, CAS
On behalf of CMS collaboration

09/11/2022

Higgs 2022, Pisa

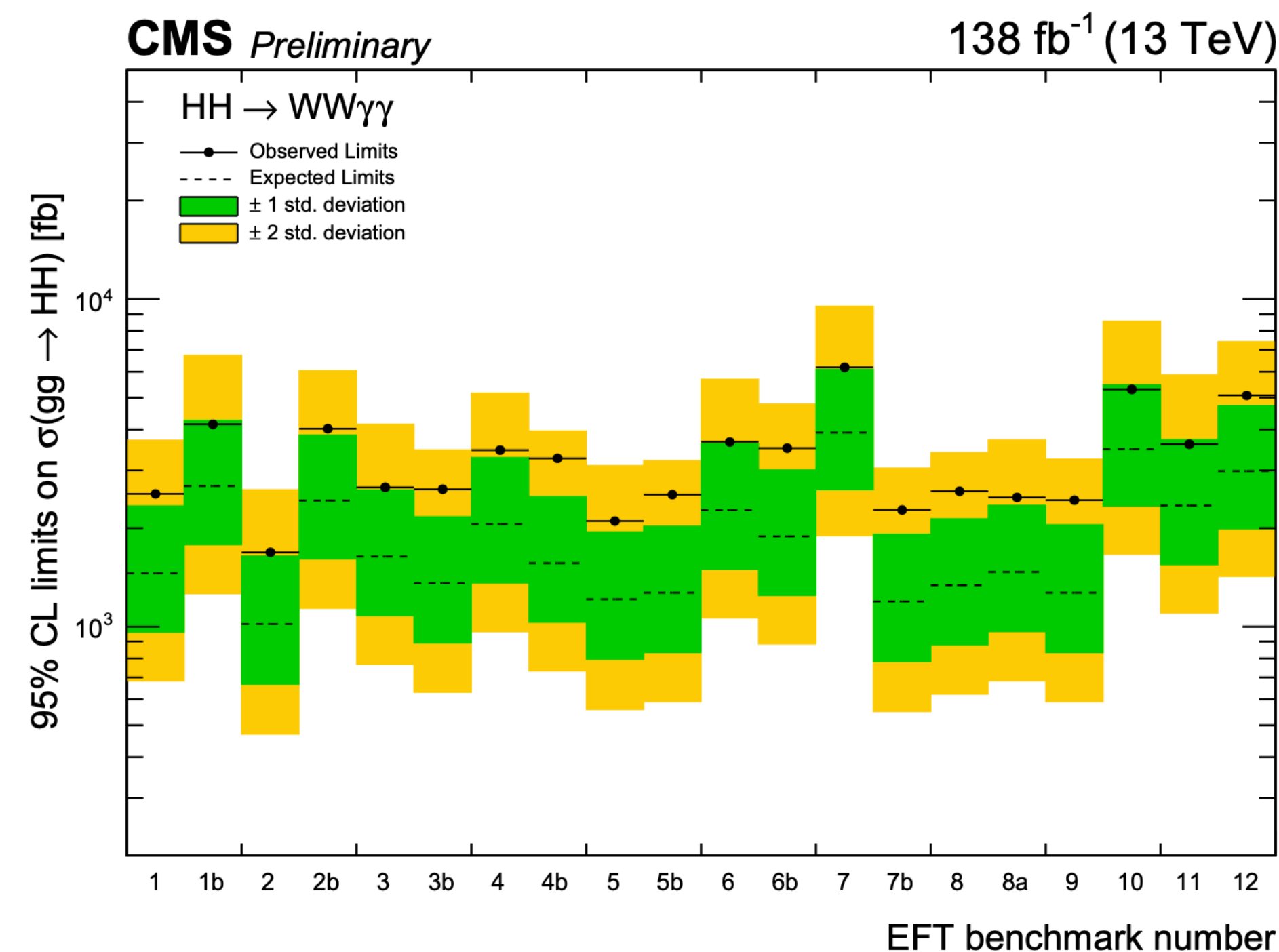
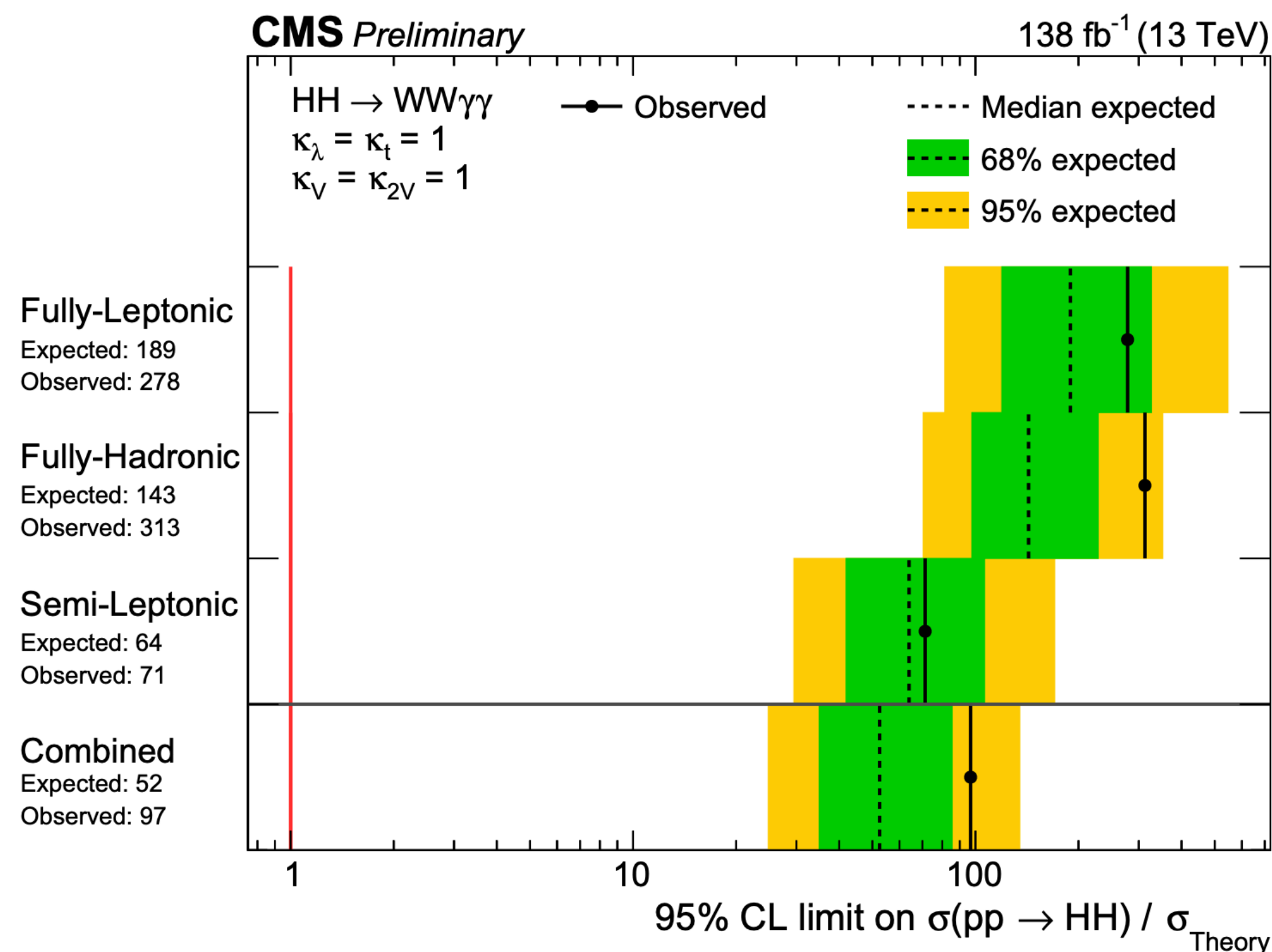
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[Higgs 2022](#)

Information	Discussion (0)	Files
CMS Physics Analysis Summaries		
Report number	CMS-PAS-HIG-21-014	
Title	Search for nonresonant Higgs boson pair production in the $WW\gamma\gamma$ channel in pp collisions at $\sqrt{s} = 13$ TeV	
Corporate author(s)	CMS Collaboration	
Collaboration	CMS Collaboration	
Subject category	Particle Physics - Experiment	
Accelerator/Facility, Experiment	CERN LHC ; CMS	
Abstract	A search for nonresonant production of Higgs boson pairs in final states with two W bosons and two photons is presented. The search uses data from proton-proton collisions at a center-of-mass energy of $\sqrt{s} = 13$ TeV, recorded with the CMS detector at the LHC between 2016 and 2018, which correspond to an integrated luminosity of 138 fb^{-1}. This is the first search performed in this final state by the CMS collaboration. The observed (expected) 95% confidence level (CL) upper limit on Higgs boson pair production cross-section is evaluated to be 3.0 (1.6) pb, corresponding to about 97 (53) times the standard model prediction. Scans of modified SM and purely beyond SM (BSM) coupling parameters in an effective field theory framework result in an observed (expected) constraint on the Higgs boson self-coupling strength of -25.8 (-14.4) to 24.1 (18.3) times its SM value, and a constraint on the magnitude of a direct coupling of two top quarks to two Higgs bosons of -2.4 (-1.7) to 2.9 (2.2) at a 95% CL. Additionally, observed (expected) 95% CL upper limits are placed on twenty effective field theory BSM benchmark scenarios ranging from 1.7 to 6.2 (1.0 to 3.9) pb.	

[CMS PAS HIG-21-014](#)

非共振态双希格斯分析:结果



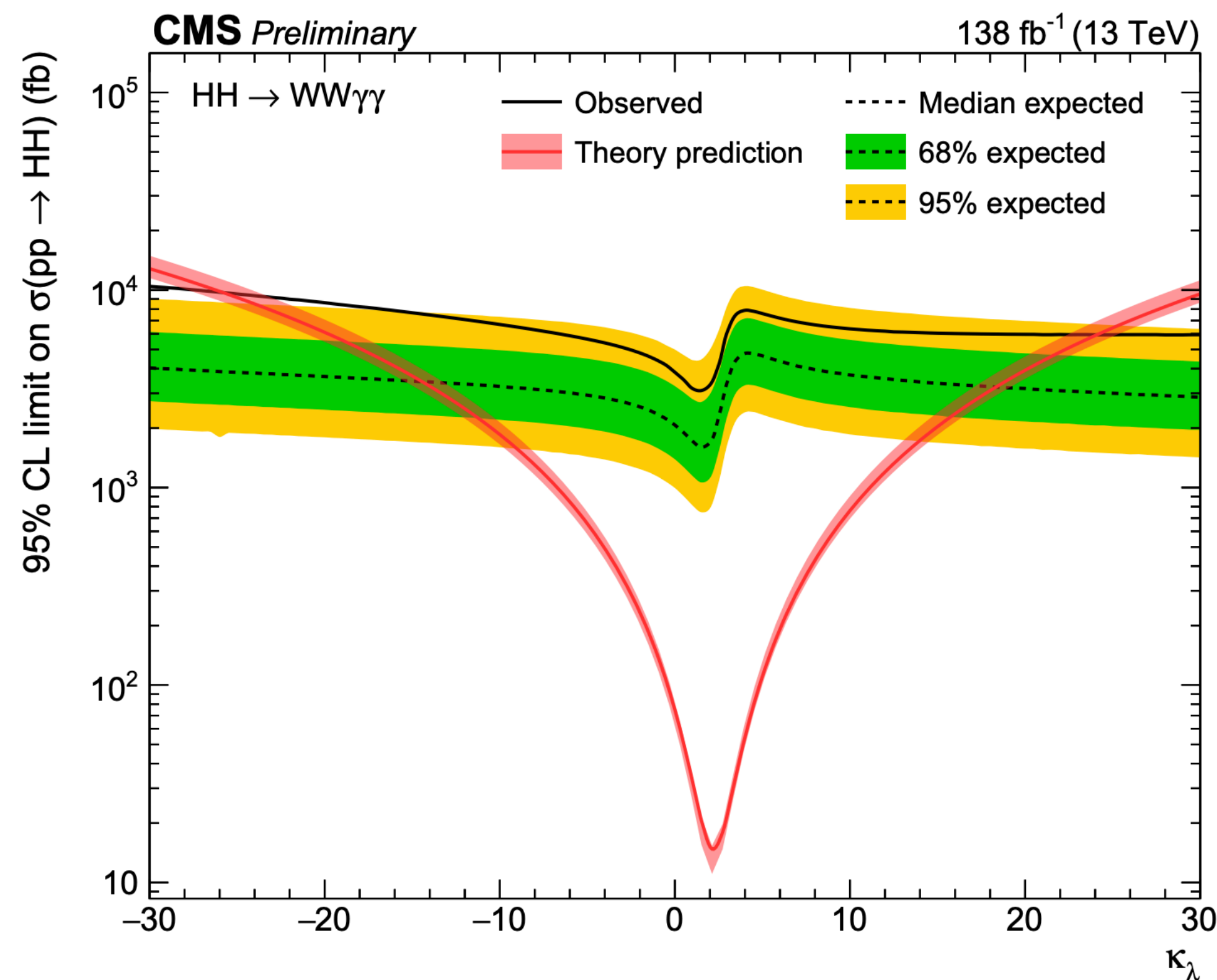
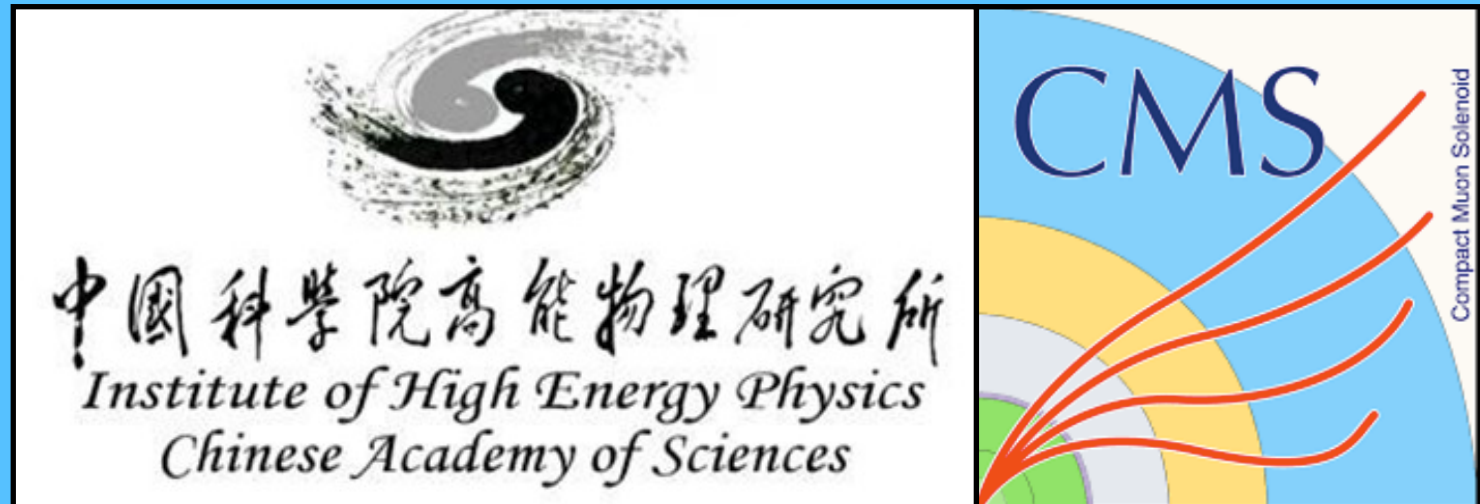
► **Observed(Expected)SM上限结果:**

- 97(52)xSM 预测值

► **Observed(Expected) EFT上限结果:**

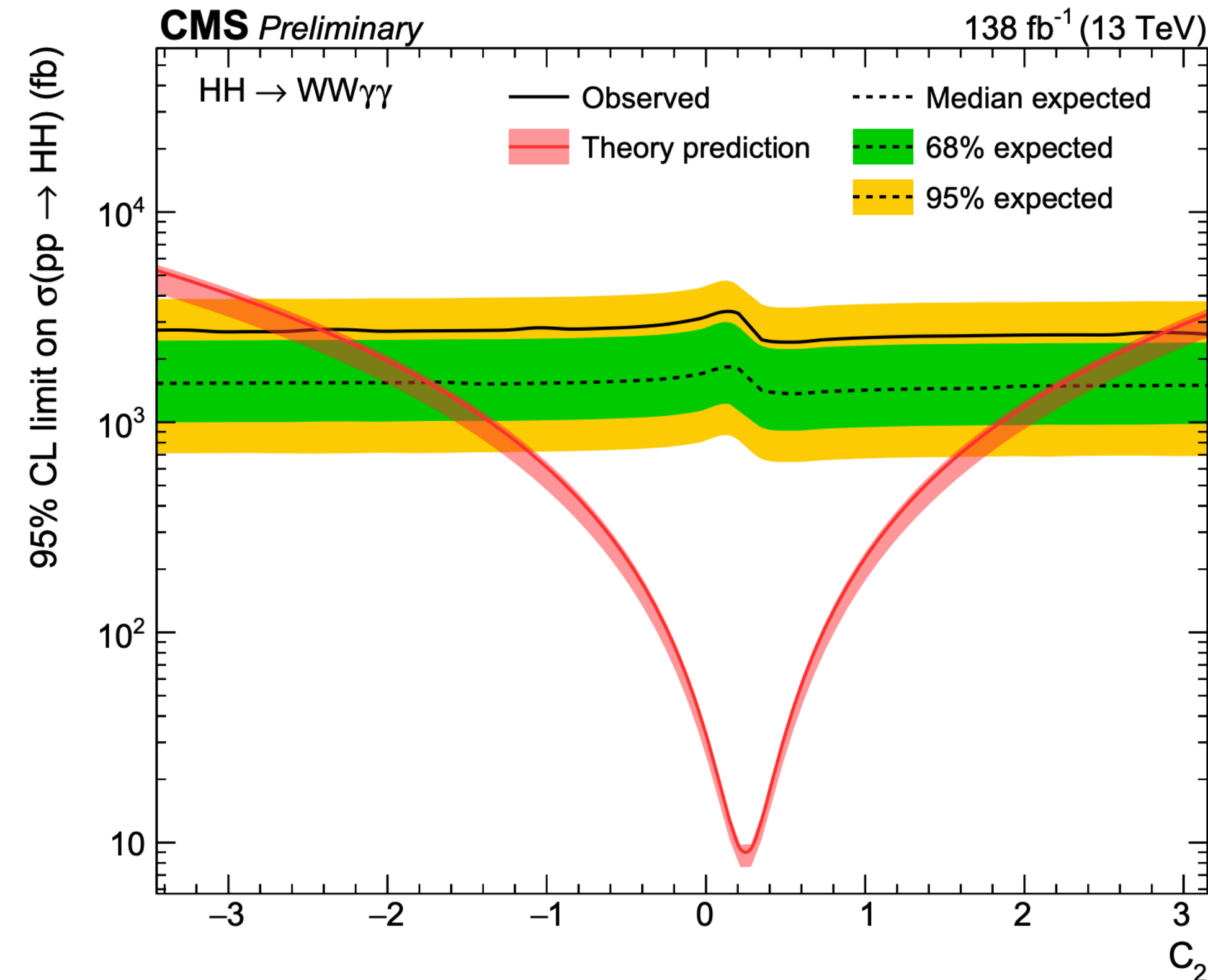
- 1.7 - 6.2 (1.0 - 3.9) pb

非共振态双希格斯分析:结果



► **Higgs** 自耦合参数限制范围:

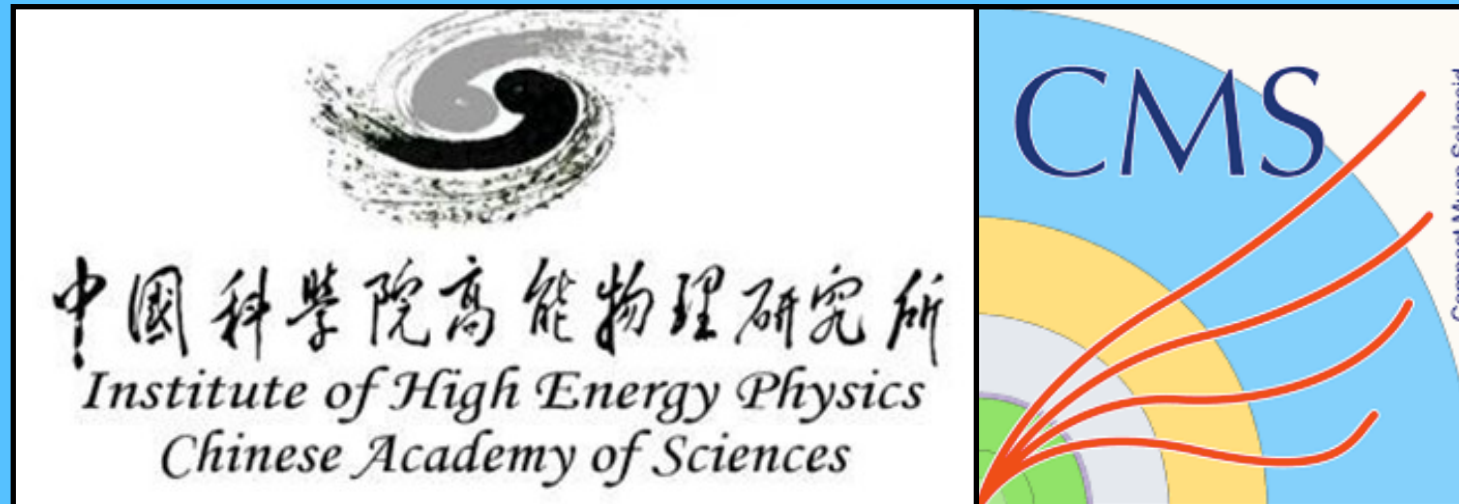
- Obs. (Exp.) $\kappa_\lambda \in [-25.8 \text{ } (-14.4) , 24.1 \text{ } (18.3)]$



► **双Higgs与2 top**耦合参数限制范围:

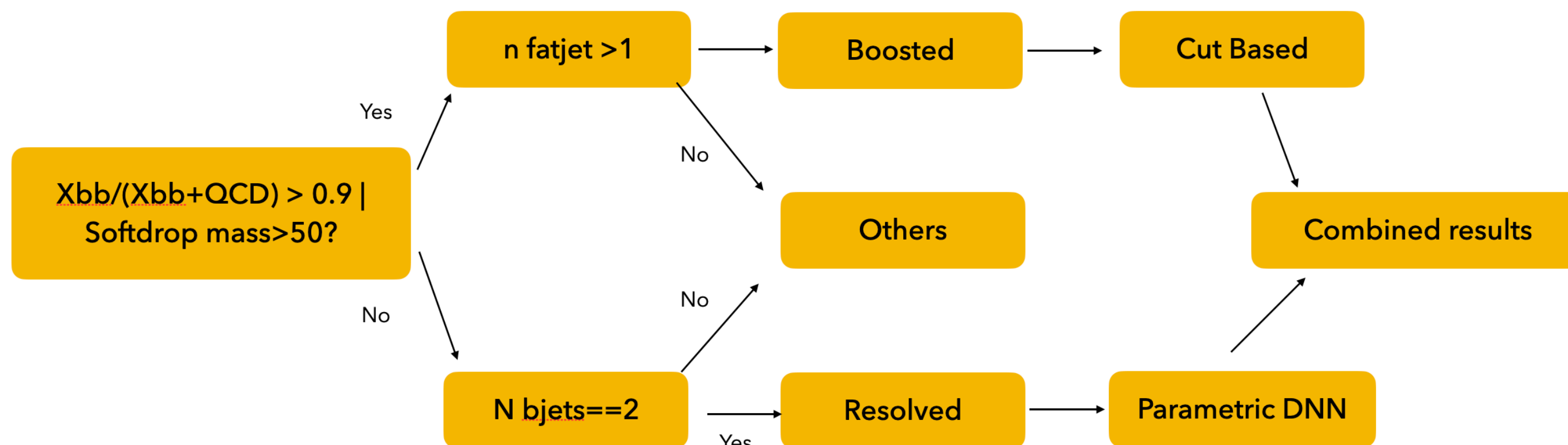
- Obs. (Exp.) $C \in [-2.4 \text{ } (-1.7) , 2.9 \text{ } (2.2)]$

共振态的双希格斯分析



► 本分析是通过 **$bb\gamma\gamma$** 衰变道研究共振态双希格斯 (**HH/HY**) 产生:

- 在CMS内部会议报告了初步结果 (HH部分)
- 确定了分析策略(HY 部分)



Search for Heavy Resonant decays into HH in $bb\gamma\gamma$ and $WW\gamma\gamma$ boosted channel

I.Dutta, F. Monti, C. Pena, C. Mantilla Suarez, R. K. Sharma, J. Tao, **C. Wang**, J. Wang, S. Xie, Z. Zhang

04/11/2022

IHEP HH team

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► 参与了HH combination:

- 目前在使用Powheg产生20个NLO的样本
 - 目的是为了验证之前被应用于HH分析中的reweight方法的准确性

► RunIII 的蒙卡产生工作:

- 使用Madgraph产生了Higgs到双光子的相关的gridpack
- 产生了部分RunIII的background样本 (QCD等)

► 探测器值班工作:

- 参与了一周的ECAL值班

► 非共振态HH分析:

- 发表了 $WW\gamma\gamma$ 衰变道的结果

► 共振态HH/HY分析:

- 获得了初步结果 (HH部分), 优化了分析策略

► 其他工作:

- 为HH combination测试reweight方法
- 为Higgs到双光子组产生gridpack
- ECAL值班