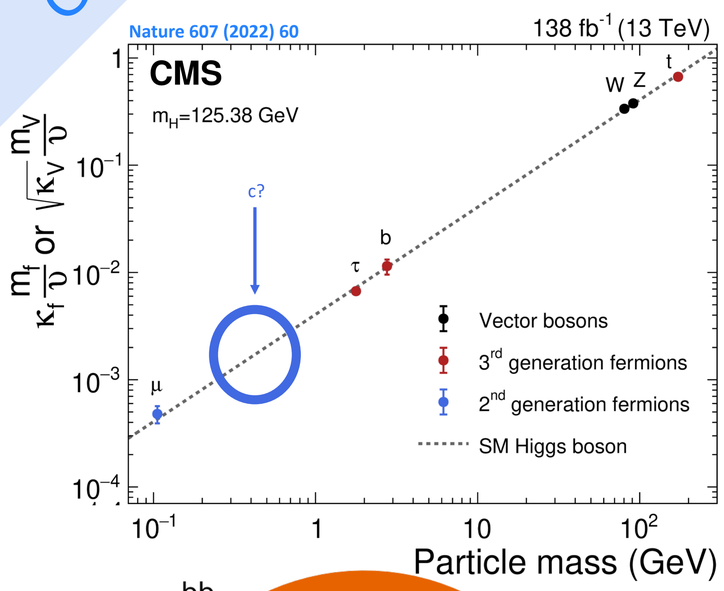
ICHEP 2024

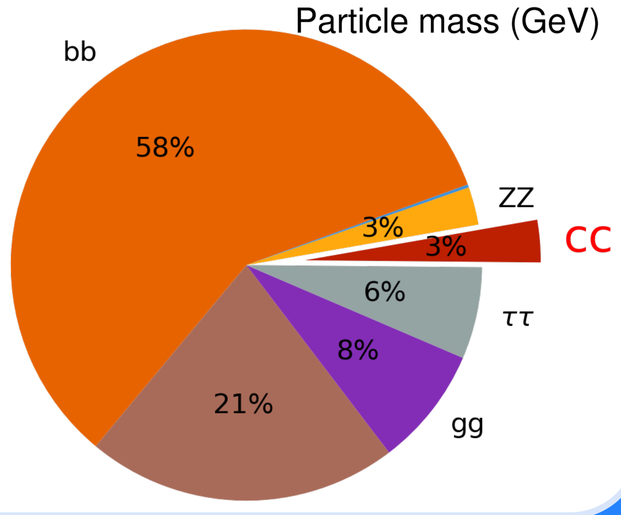
Status of Higgs-charm coupling measurements at CMS

Maarten De Coen (UGent) for the CMS Collaboration

GHENT UNIVERSITY
FACULTY OF SCIENCES

Goal — Gen 2!



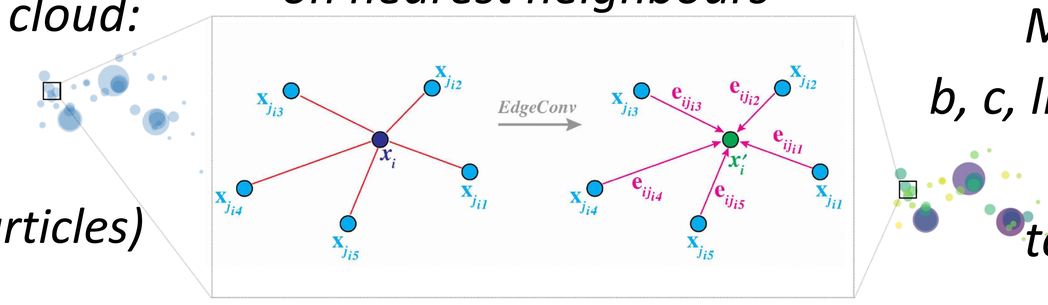


How? — Our secret: *ParticleNet* c-tagging

Phys. Rev. D 101, 056019 (2020)

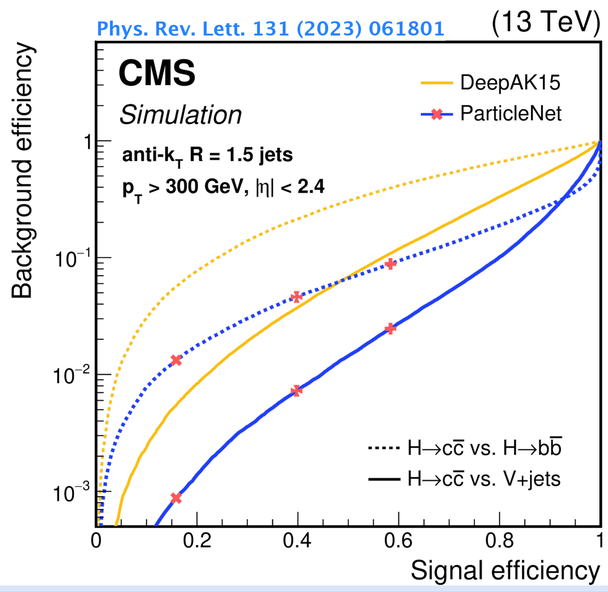
Advanced GNN architecture based on nearest neighbours

Jet as point cloud: low-level event info (vertices, particles)

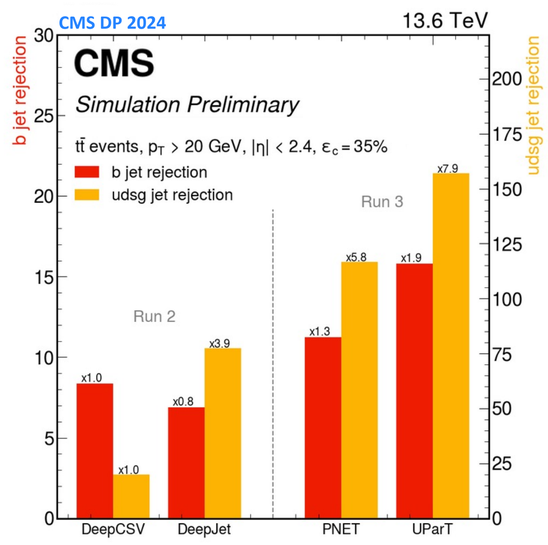


Multi-class: b, c, light jets or decays of top, W, Z, H

Boosted Higgs to cc



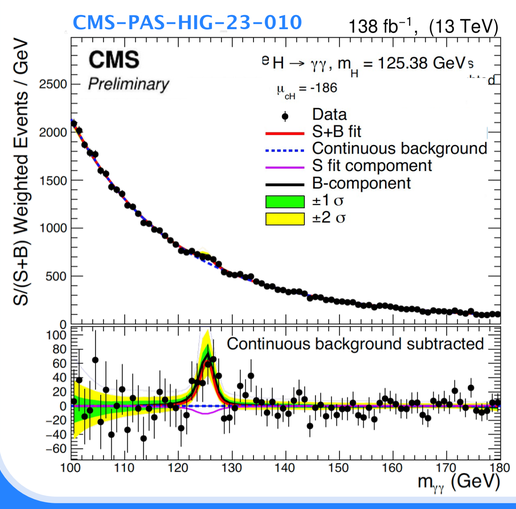
Heavy flavour jets

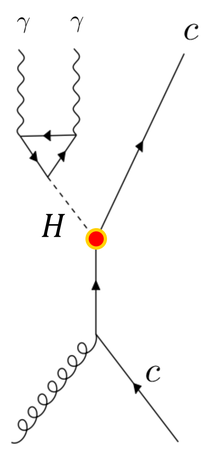


$cH(H \to \gamma\gamma)$

- High resolution, but ggF background

$\sigma < 233 \times SM$

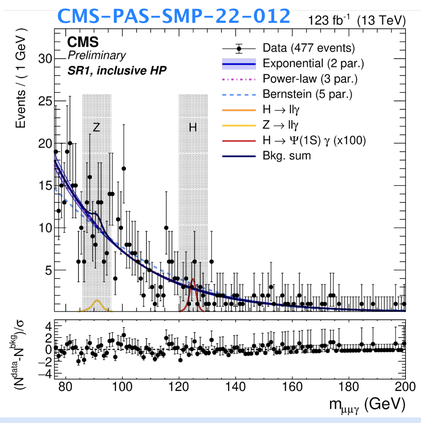


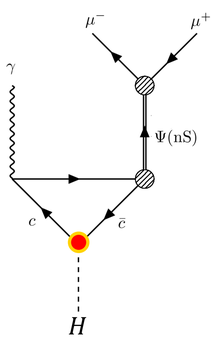


$H \to \Psi(nS)\gamma$

- Limited sensitivity to coupling

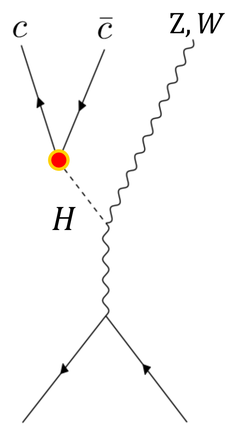
$\sigma < 88 \times SM\ (1S)$





$VH(H \to c\bar{c})$

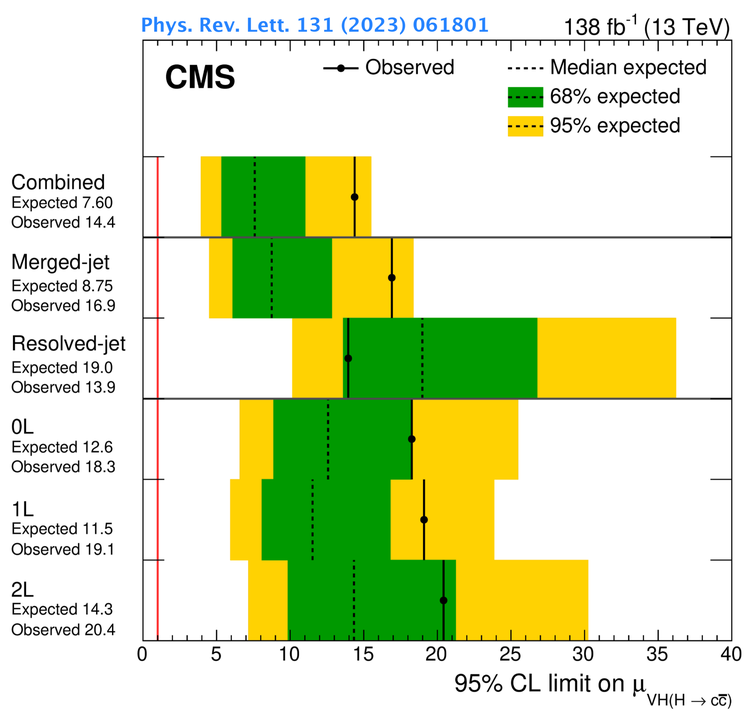
- Lower background (leptonic W/Z decays)
- Exploit recoil: boosted and resolved



Strongest to date!

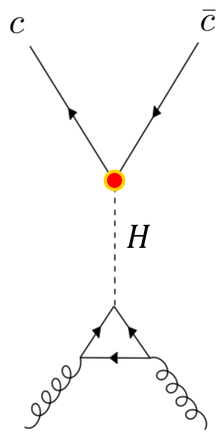
$\sigma < 14 \times SM$

$1.1 < |\kappa_c| < 5.5$

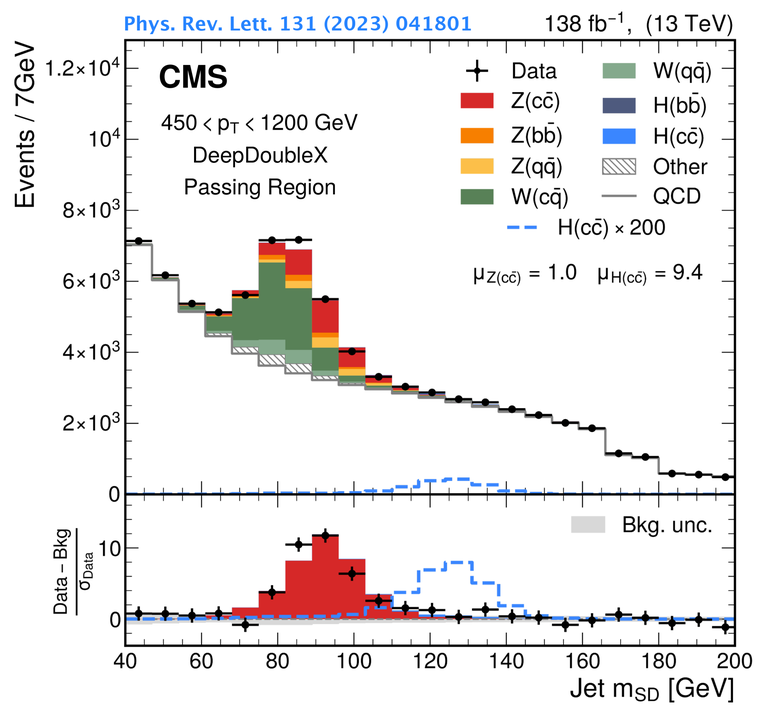


$ggF(H \to c\bar{c})$

- Highest rate
- High Background
- Reduce with boosted Higgs

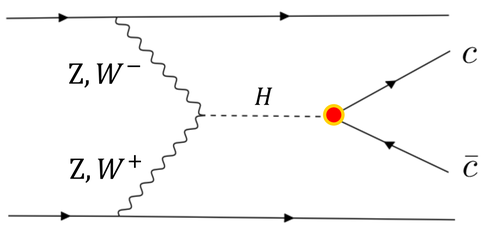


$\sigma < 47 \times SM$



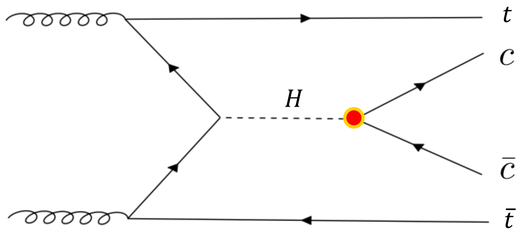
Sit Tight!

VBF



Relatively large cross-section, forward jets

$t\bar{t}H$



Rare process, but resonance rich

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