



NATIONAL SCIENCE CENTRE
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Probing Composite Higgs with Gravitational Waves

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Based on:

JHEP 2024.1:106

with A. Banerjee and M. Merchand

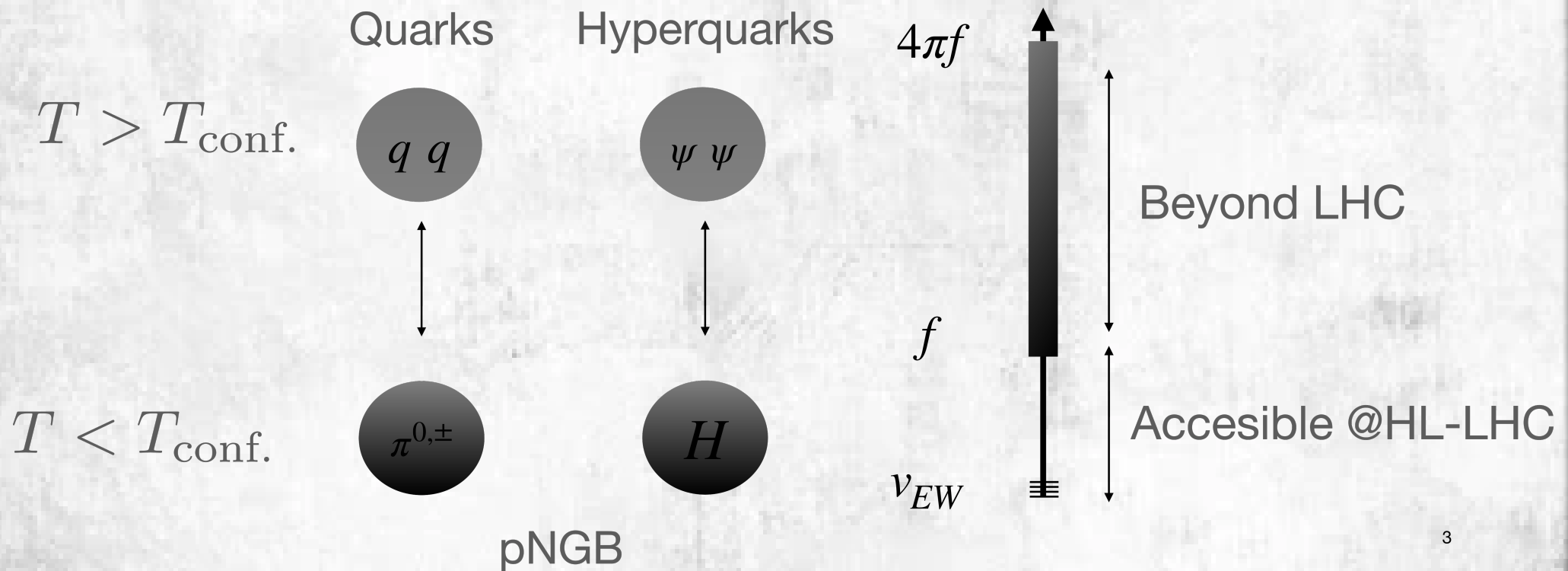
**BSM odyssey: turns and
twists in particle theory**

22/07/2025, Cargèse

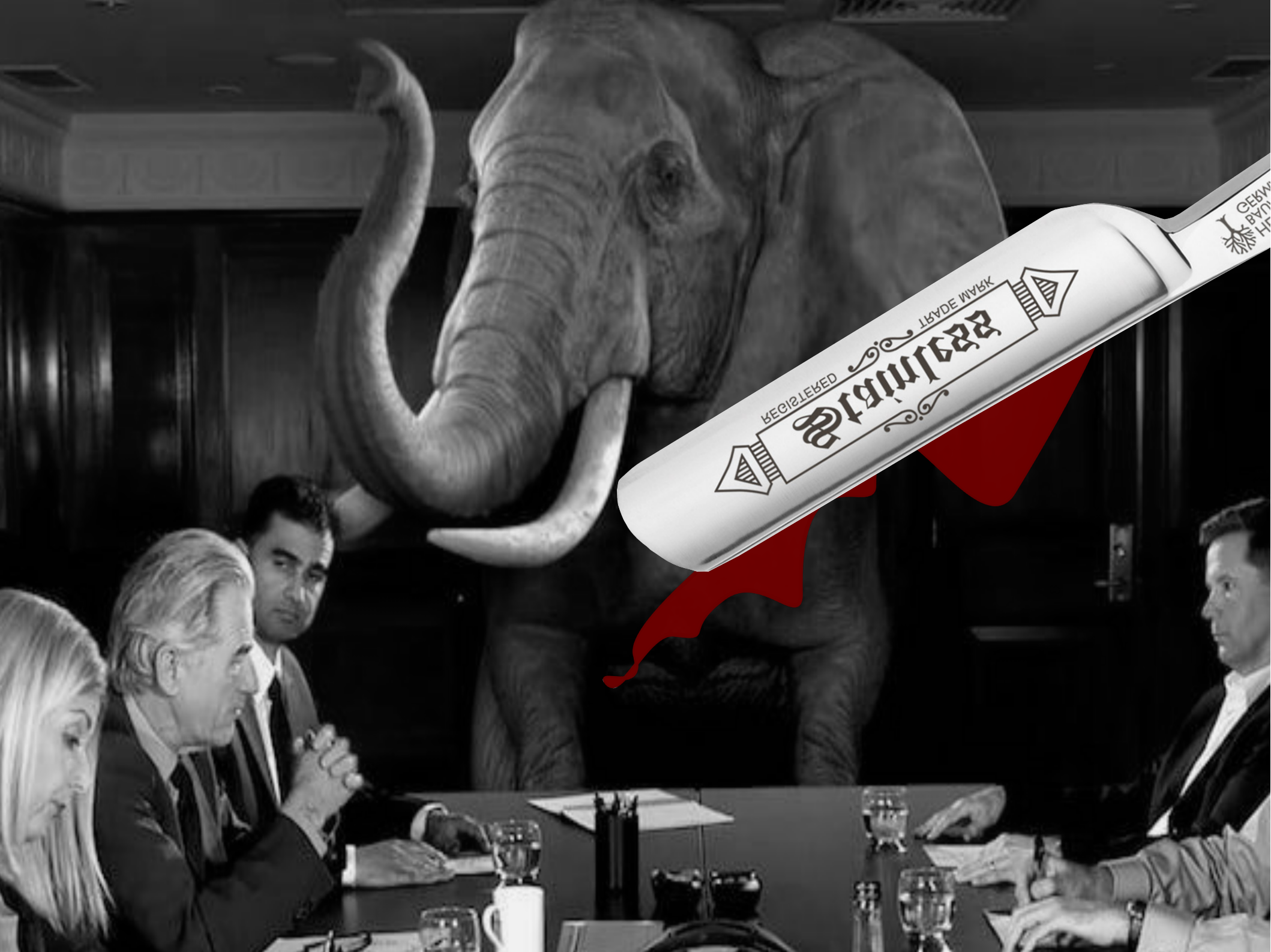
Is the Higgs boson truly Fundamental?

We don't know!

It might be composite...





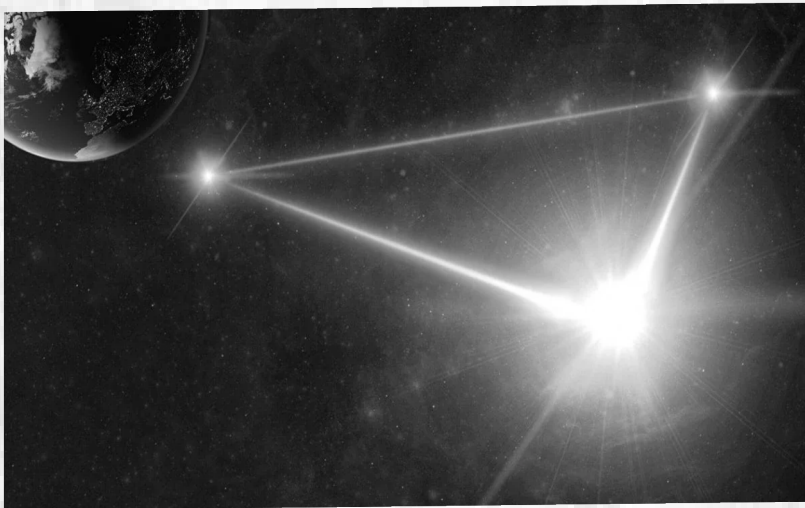






Motivation?

- EW Hierarchy problem
- Baryon asymmetry
 - First order phase transition
 - CP-violation



Verifiability?

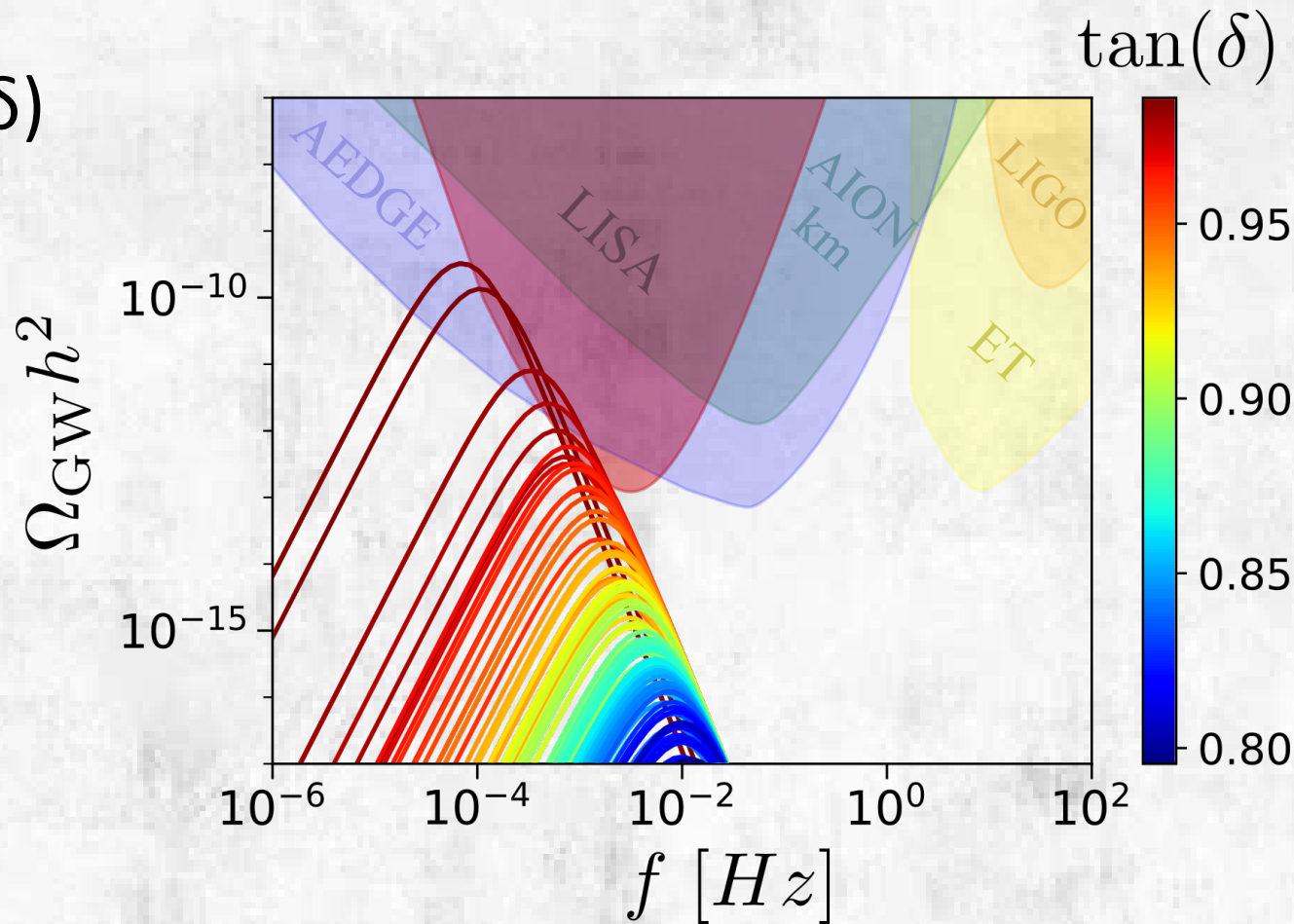
- Can be probed by gravitational wave (GW) detectors
- Will be tested with HL-LHC



Phenomenology

Stochastic gravitational waves signal

- Larger values of $\tan(\delta)$ lead to stronger GW signal.
- Observation of GW background would inform us about the amount of CP violation in the model



GW detection would tightly constraint Hyperquark phase!

Conclusions

- 1) Standard Model Higgs could be composed of confined fermions.
- 2) Composite Higgs scenarios:
 - explain the hierarchy of Higgs mass,
 - will be probed by HL-LHC.
- 3) Detectable GW signal is expected only in the region of the model parameter space with high CP violation.