SMEFT activities in CmF RA3

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color meets flavor

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Outline

- The goal is to identify and connect activities within the CmF research groups that are related to SMEFT interpretations, global fits etc.

- Where are possible **synergies**? How do we combine our measurements at **different experiments**, final states and energy scales

- Can we use **common software tools** and build up **common expertise**?

- All of this is preliminary, i.e. the feedback I received so far - we all decide how we want to collaborate

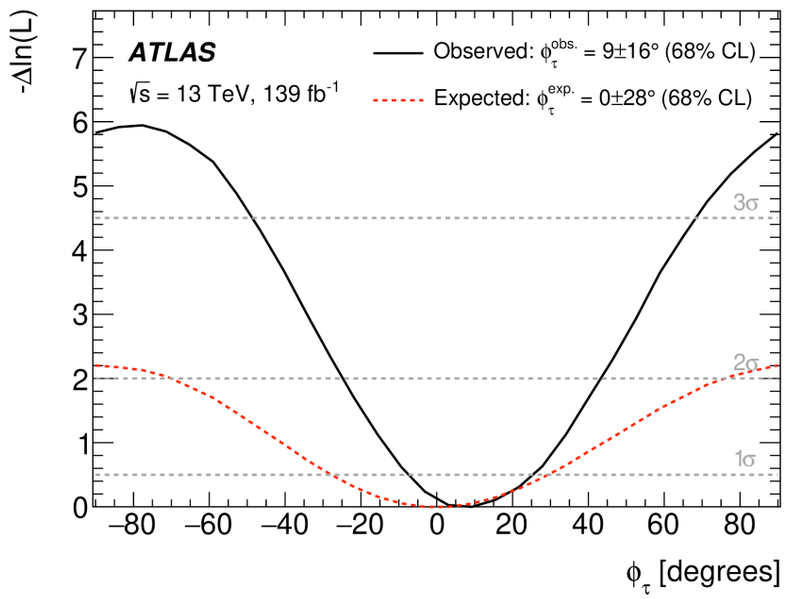
ATLAS EXPERIMENT

Activities in Bonn (Desch/Bechtle/Grefe)

- ATLAS: Most expertise in $H \to \tau\tau$ properties: STXS, test of CP-violation in Yukawa couplings. Input to ATLAS EFT fits

- Future e^+e^- colliders: interpretation of constraints from single Higgs observables (1 PhD position funded through CmF)

- We also plan to implement collider constraints in global EFT fit. Currently we consider jelli/smelli as the most promising option (we are in direct contact with the authors)



Activities in Dortmund (Kröninger)

- Plan to develop a framework to investigate the sensitivity of observables on Wilson coefficients in global fits (1 PhD position funded by CmF)

  - Develop tool to store and manage EFT models, their free parameters, and the relevant observables and measurements.

  - Provide observable parametrisation and calculate their derivates, as well as statistical tools and goodness of fit evaluation

- Experience with EFTfitter

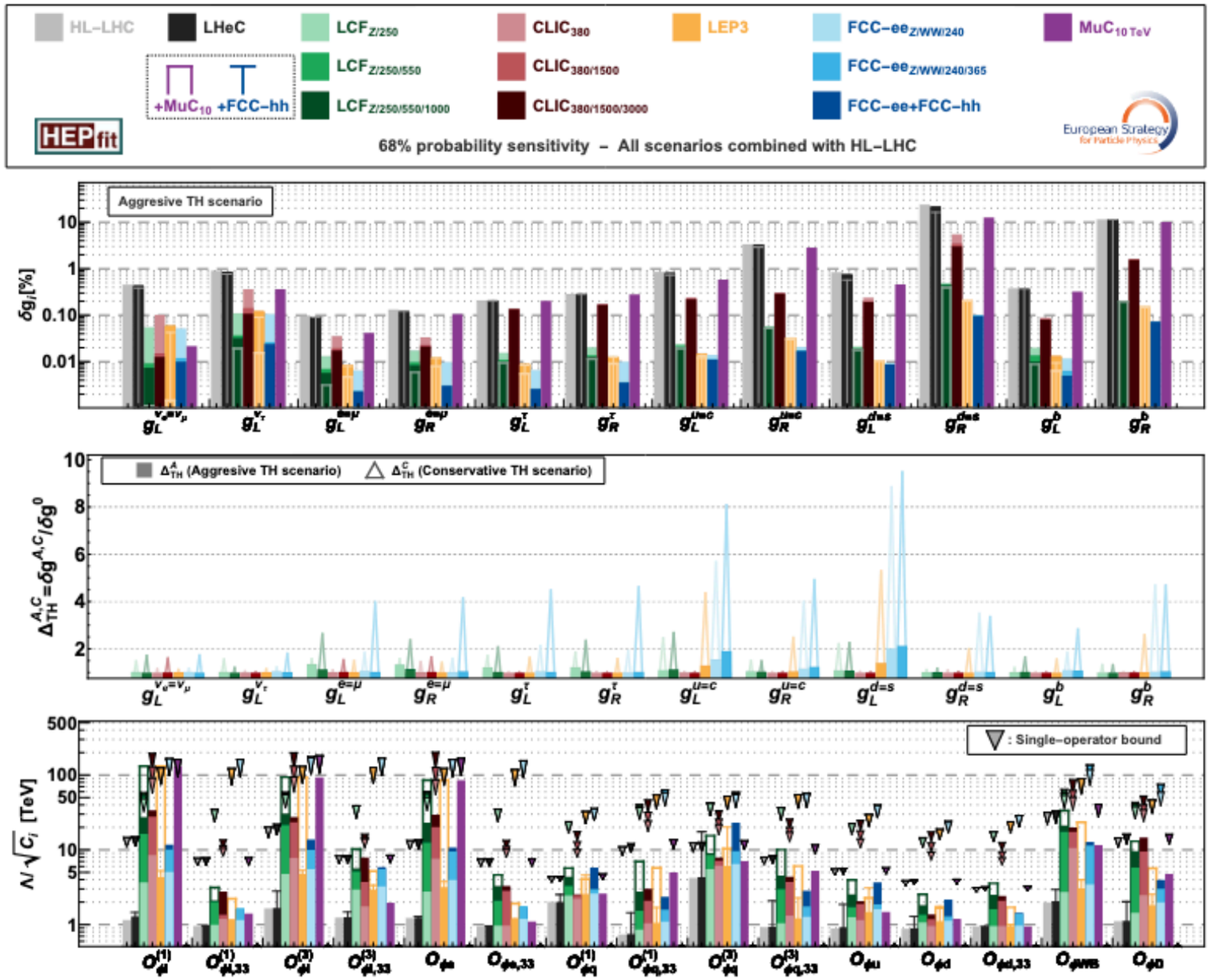
Activities in Siegen (Diez Pardos)

- Plan to work on measurements of spin correlations in $t\bar{t}$ events and their EFT interpretations

- EFT interpretations of measurements in top+X topologies

Future Collider Potential

- SMEFT fit in the electroweak sector from the physics briefing book of the 2026 European Strategy: arXiv:2511.03883. 124 Wilson coefficients (no CP violation, U(2) flavour assumption).

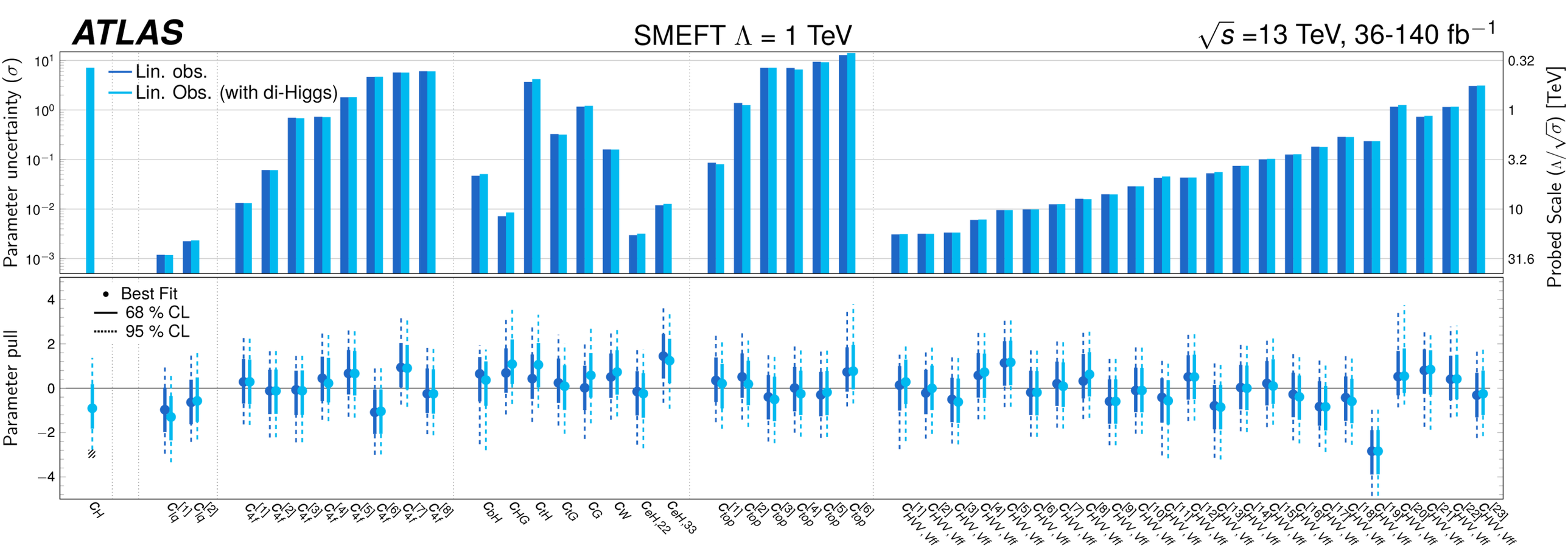


Uses HEPfit

Experiment specific efforts

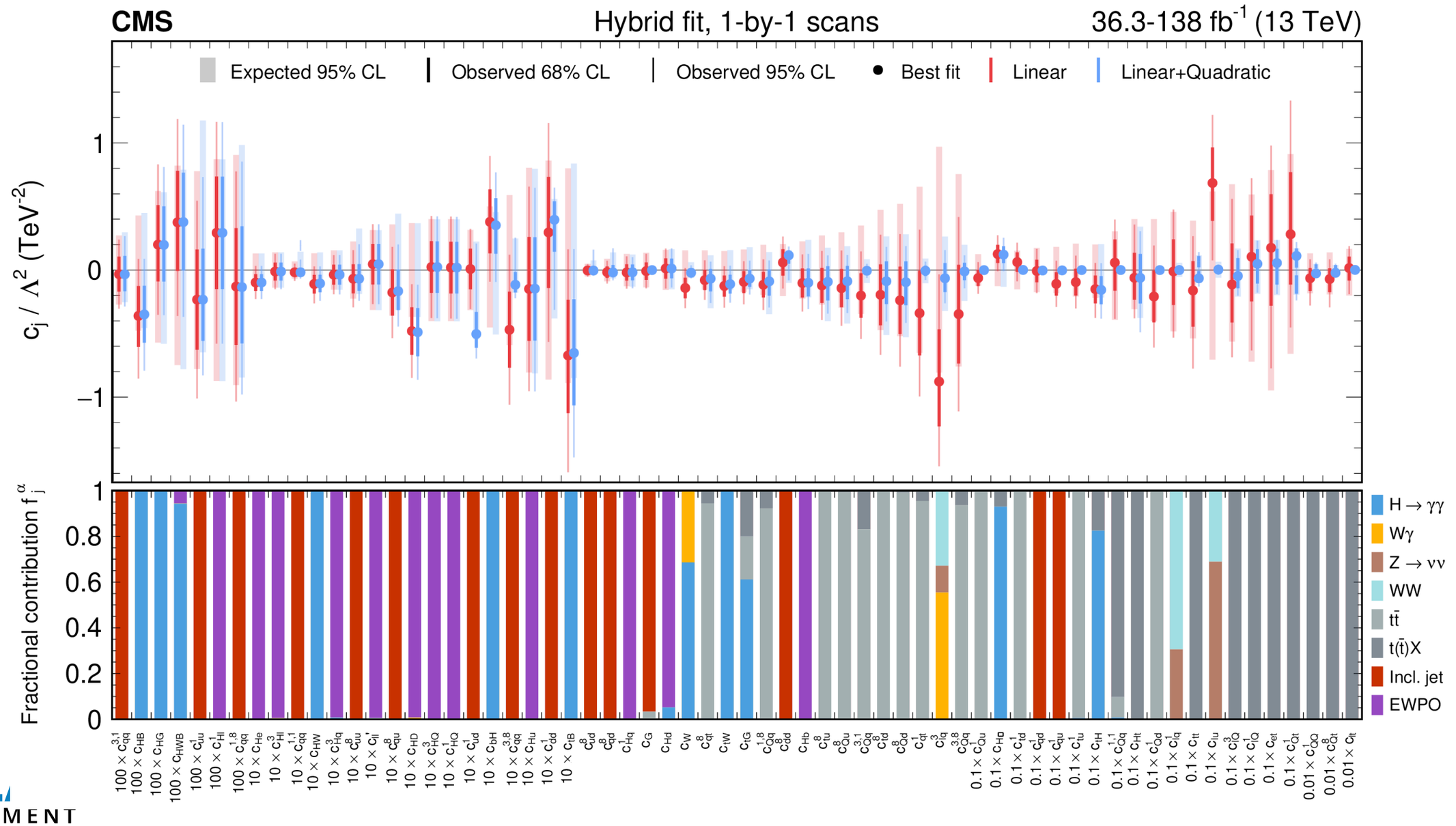
- ATLAS recently published a large dim6 EFT fit, covering Higgs, Top and Electroweak operators (48 Wilson coefficients in the Warsaw basis). Includes LEP, SLD constraints.
  - arXiv:2604.21670

Uses ATLAS SW:
EFTrexFitter



Experiment specific efforts

- Similar to the ATLAS result constraining 64 individual Wilson coefficients and 42 linear combinations. arXiv:2504.02958



Activities in RA2 (Stefkova)

- Important to make connection to the flavor sector (RA2)
- Plans to measure semi-leptonic and rare electroweak decays and interpret them in Weak Effective Theories (WET)
- Recent example from WET constraints extracted from measurements of the $B^+ \to K^+\nu\nu$ final state (Phys. Rev. D 112, 092016)