

# PRECISION THEORY FOR ENERGY AND INTENSITY FRONTIERS

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☀️ *Precise Standard Model predictions are required to discover the unknown at the LHC, DUNE, mu2e, muon g-2, dark matter searches,...*

☀️ *Experiments are only as good as the theory behind them — being limited by the accuracy of the theory is a missed opportunity*

☀️ *Even “clean” signals of New Physics require precision computations to find and interpret the signal*

**New Physics may be hidden in deviations from SM**

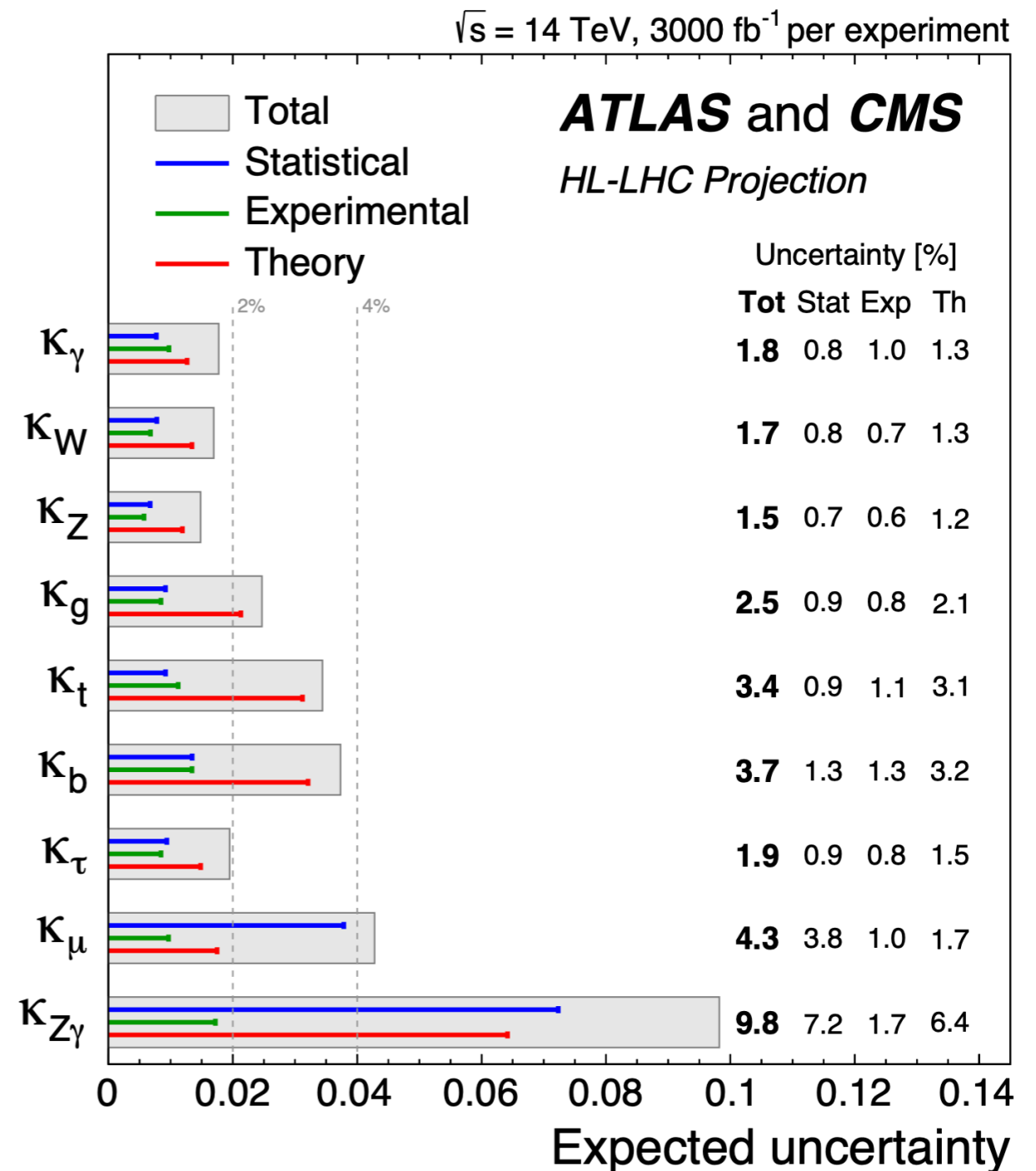


Figure from arXiv:1902.00134

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- ✻ *Physicists in the US performed many pioneering computations that allowed to establish the Standard Model*
- ✻ *During the LEP era US started losing leadership in the precision computations*
- ✻ *Precision collider physics is now dominated by European groups*
- ✻ *There is insufficient theory support for low energy experiments*
- ✻ *Even US based experiments at the intensity frontier receive insufficient effort from the theory community: large emphasis on novel signatures of beyond the Standard Model physics, insufficient effort to improve theory input to the accuracy of current and future experiments*

**Lattice computations are notable exceptions, partially thanks to SciDAC scheme**

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We see faculty members working on precision computations move from the US to Europe — **we need to reverse the direction of the flow**

*Main reason: European funding model allows for creating larger focused research groups — these are needed to perform increasingly challenging computations*

- *Encourage collaboration between institutions (Topical Collaborations like in NP)*
- *Lab theory groups should provide core support for experiments and collaborate strongly with University based PIs*
- *Increase funding for theory: PI + postdoc + student is the critical mass for typical precision computations: even more needed to compete with leading European groups*  
***(consolidation better than fragmentation)***
- *Strengthen ties between experimental and theory communities, create theory initiatives dedicated to experiments (example: muon g-2 Theory Initiative)*