FUNDAMENTAL PHYSICS IN SMALL EXPERIMENTS (TOPICAL GROUP 3)

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MAIN PHYSICS TOPICS

- Electric dipole moments (CP violation):
  - EDMs (besides QCD theta-term) instant discovery of new physics with energy scales up to 1000's TeV
  - Broad experimental approach due to a variety of possible CPV sources
  - HEP opportunity: storage ring proton EDM
- Magnetic dipole moments (focus on the muon):
  - Search for physics beyond the SM at the few TeV scale
  - Large theory effort in the next years to determine the hadronic contributions
- Precision experiments (HEP and AMO communities):
  - Search for fundamental symmetry violation (C, T, P, Lorentz, CPT)
  - Tests with gravity: fundamental symmetries, GR, quantum nature, short-range corrections
  - Wide set of low-energy approaches complementary to large-scale facilities

TOPICAL GROUP REPORT

- Thanks to many contributors and editors
- Advanced draft report is available: https://www.overleaf.com/read/ysshsctxbhck
- Will also provide this link via Slack and the email list
- Please send us any feedback / suggestions for improvements by end of July:
  - Tom Blum: thomas.blum@uconn.edu
  - Peter Winter: winterp@anl.gov

TODAY SUMMARY OF WHITE PAPERS

- Ralf Lehnert: Precision Studies of Spacetime Symmetries and Gravitational Physics
- Aida El-Khadra: Prospects for precise predictions of am in the Standard Model
- Tanmoy Bhattacharya: EDMs and the search for new physics
- On Kim: The storage ring proton EDM
- Angela Papa: Muon EDM at PSI

SUMMARY

- Tests of fundamental symmetries (P, CP, CPT,...) offer a compelling program for the next decade:
  - **EDMs strong part of the next decade's research program**, especially with prospects for storage ring EDMs, ongoing nEDM experiments, and complimentary AMO experiments
  - **Magnetic dipole moments** (electron, muon, tau) also have timelines that **span the next decade**; the Fermilab Muon g-2 result may clarify the path forward
  - **A large active community for precision tests** of T, P, CPT, Lorentz and gravity in AMO, NP, and HEP
  - A lot of experimental / sensor techniques are **applicable across multiple communities**, need to share knowledge and opportunities for collaboration