

# UK Input to European Strategy for Particle Physics /Dark Matter/

PPAP meeting, Birmingham, 21 Sept 2018

# Discussion

1. Direct dark matter searches with large G-3 detector using noble gases liquids
  - a. Likely to be one LXe G3 'rare-event search observatory' somewhere in the world and due to large size possible physics to cover: WIMPs, ADM, IDM, MDM, WIMPflation,  $0\nu\beta\beta$ , solar  $\nu$  and SN
  - b. Experiments are now growing to a scale that is starting to require major lab infrastructure. Will require large international collaboration which is an evolution from current situation
  - c. The UK aims to be prominent in this and has a strong DM community
  - d. UK primary interest for near future DM experiments is in using liquid Xenon
  - e. APPEC points to two experiments with different targets using LXe and LAr
  
2. Other dark matter experiments like ADMX, QUAX and SHiP
  - a. Physics to cover: Axions, alps, HSP, dark photons ...
  - b. UK groups are involved in some of them

# Discussion

3. CERN participation - use of existing infrastructure and technical expertise
  - a. Contribute/continue support to an “ecosystem” of DM experiments covered by PBC-BSM
    - i. CERN could play a significant role in the next-generation QCD axion detectors:
      1. Design of high field magnets
      2. Design of RF and microwave electronics
      3. New detector physics
  - b. R&D in the cryogenics and purification systems for LXe and LAr based on experience from ICARUS and DUNE:
  - c. Use of LAr detector as veto system based i.e. on ProtoDUNE infrastructure
  - d. Contribute to the development of the directional dark matter experiments using high granularity readout based on micro-pattern detectors
  - e. Continue dark matter searches with the direct detection at the LHC to constrain new physics beyond Standard Model