



Submission to PPAP - overview



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Particle Physics Prioritisation Process

- European Strategy for Particle Physics Update in June
- UK now needs to decide how it prioritises
 - ESPPU is a major input, of course
- My understanding of the process:
 - PPAP “Particle Physics Advisory Panel”
 - recommends overall physics prioritisation
 - PPTAP “Particle Physics Technology Advisory Panel”
 - recommends technology/R&D prioritisation in light of ESPPU
 - 1 year “lifetime”
 - Not clear how the two panels align to each other
 - Little common membership
- Seek written inputs from the community
 - Deadline is this Friday 27th Nov





Muons Submission - Aims

- Aim of our submission
 - Explain the position of our community
 - nuSTORM as a stepping stone to muon collider
 - Highlight the excellent physics potential of nuSTORM
 - Highlight the excellent physics potential of muon collider
 - Emphasise strong desire in UK for R&D towards these facilities
 - Remind about the world-leading expertise that we have developed in the UK
 - Especially, UK has the European expertise in muon beams!





Section 1 - Introduction

- Remind that muon beam R&D and neutrino cross-sections were both high priority in ESSPU
- Remind that UK is world leader in muon beam R&D
 - MICE
 - EMMA
 - Targetry
 - Design Studies
- Remind that UK is leader in nuSTORM





Section 2 – Muon Collider

- Remind that muon collider has great physics potential
 - Entire beam energy is available for short-distance reactions
 - Compared to e.g. pp collider
 - High energy reach
 - Compared to e.g. e+e- collider
- Few lines on muon collider facility
 - Target, cooling, acceleration
 - Small footprint (e.g. compatible with CERN site)





Section 3 – nuSTORM

- “3 pillars”
 - Neutrino cross-section measurement
 - Sterile neutrinos and BSM physics
 - Muon beam tests
- Overview of the basic design
 - Pion target → storage ring with large momentum acceptance
 - Muons decay to make neutrinos
 - Some muons may be taken for cooling
- Mention leverage for other parts of the STFC programme
 - FFA → ISIS upgrades, hadron therapy gantries, LhARA
 - High power targetry





Section 4 – Plans

- Note formation of CERN-led collaboration
- Note UK expertise in muon beam physics
 - significant past investment
- Propose development of
 - the physics case for the muon collider and nuSTORM facilities;
 - the nuSTORM facility design;
 - analysis of technical risks inherent in the muon collider accelerator facility and mitigation strategies
 - a case for using nuSTORM as a demonstrator for the Muon Collider; and
 - the muon collider design
- Exploratory phase, followed by definition phase
- Prioritisation to maintain and enhance leadership
 - Alternative is to lose that (hard won) leadership!

