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# Introduction

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# Strategic Detector R&D Proposal

- History to date: Europe (see Phil's talk)
  - European roadmap 2020 mandated new programme of strategic R&D
  - Substantial work in 2021/22 to define an R&D roadmap
  - Roadmap accepted by Council and new DRDC panel set up to evaluate proposals to form new collaborations – now under way
- History to date: UK
  - PPTAP reported to TAAB on the scope and motivation of future R&D
  - Proposal for strategic R&D presented to STFC via PPAP in September 2022
    - Deemed relevant / plausible, but not suitable for Infrastructure Fund submission
    - Broad community support for the proposal from both PP and PA communities
  - After extensive discussion, there is opportunity for SoI in September 2023
    - Money *potentially* available in FY24/25, but we will need to make a very strong case
    - STFC will require an organised project that can be reviewed / tensioned by the PPRP
- What we need to do today
  - Establish how we will collectively generate an SoI and following proposal
  - Define the broad scope of UK interests and capabilities
  - Define how we will set up a steering group to develop the proposal

# Strategic R&D

- A spectrum of R&D is needed to deliver projects
  - 'Blue skies R&D' (low TRL): new concepts, small demonstrators, small teams (with good support)
  - 'Strategic R&D' (mid TRL): developing systems and prototypes, investigating cost / performance, larger teams with involvement of industry
  - 'Project R&D' (high TRL): developing detector for specific experiments / applications, full collaborations with substantial funding, industry as suppliers
- This proposal does not replace or reproduce PRD
  - Blue skies R&D will be supported via other means
- Collective and coordinated work is needed
  - Cost / scale / complexity is growing beyond the capacities of any group
  - Effective / efficient access to specialised tools and facilities is needed
- We need to begin 'now'
  - Yes, R&D is in tension with construction projects
    - However, these projects are now ending their R&D / setup phase and experts will need new roles
  - A ramp-up rather than a big bang is needed – though planning cannot wait
  - With tight resources, the value of a well-coordinated programme is evident

# R&D Proposal: Objectives

- Develop and sustain a world-leading capability for advanced detector technology R&D in the STFC research community
- Facilitate continued UK leadership in the European R&D programme, and subsequent resulting leadership in next-generation experiments
- Construct and support specialised facilities at UK institutes, supporting international capability in detector development
- Identify routes for rapid application of new detector technologies across national facilities, academic disciplines, and industry
- Support co-development of technologies with UK industry, leading to enhanced economic return from international investments
- Transform skills development, training and career prospects for technology-focussed early career researchers in STFC core science

# R&D Proposal: Scope and Outcomes

- Scope
  - Matched (in principle) to the scope of the European Roadmap
  - Accepts that some prioritisation will be needed, but does not make recommendations on which R&D topics are the priorities
    - This is for peer review, look at a wide range of practical and strategic criteria
    - Clearly the question of focus and 'critical mass' comes into this – this is not PRD
  - Explicitly covers both PP (collider, flavour, neutrinos) and PA (DM, quantum)
  - Focussed on both people and the required facilities in labs and institutes
- Outcomes (other than the R&D deliverables themselves)
  - Proposals via the STFC Visions process for follow-up project R&D and construction of new instruments
  - Supply of high-technology deliverables to international projects, either as UK buy in or via contracts
  - Interdisciplinary proposals for application of technology in non-STFC areas, either via the UK's national facilities or within institutes
  - Exploitation of IP within industry via licenses and other agreements
  - Direct employment of trained people in industry.

# R&D Proposal: Plan and Resources

- Three main threads
  - Medium-scale R&D projects, within the context of the European Roadmap
    - i.e. facilitating and supporting UK leadership in the DRD collaborations
    - 'Medium scale' means £1M+ per year per project, sustained in the long term
  - Funding stream explicitly for interaction with industry
    - Including development of a coherent and focussed 'offer' to UK industry
  - Distributed CDT in detector technology and data-handling
    - CDT in the sense of cohort training and industry involvement; but across many institutes
- Resources
  - Some new money is clearly needed to get going – estimate £3M pa
    - Note that we do NOT need money in the coming year other than travel, etc
  - Since there are no new core-funded construction projects on the roadmap, addition resources will become available post-2026
  - Estimate that a sustained level of £10M per year would allow UK leadership in targeted areas
  - Note that other comparable countries are already spending far more than this
    - And planning additional investment in the context of the European Roadmap

# Specific about DRD6

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- First meeting of the DRD took place earlier in January: https://indico.cern.ch/event/1212696/
- Consortia proposals expected by 24th March 2023 (this will be areas of research within DRD.
- April 20th 2023: second meeting at CERN.
- Preparation in full swing.

# What we are doing today

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- First chat to see whether there is a scope for a coordinated research programme in DRD6 (Calorimetry)
  - What R&D projects are ongoing.
  - Whether within those projects there is scope for collaboration.
  - Check institutes' interests and appetite.
- We will need to deliver a significant SOI in only a few months.
  - Do we have the critical mass to contribute effectively?