

# UK DRD: Steering Board #1

- ▶ Goals for today
- ▶ Reminder of proposal scope and objectives
- ▶ Interactions with STFC
- ▶ Proposed timeline
  
- ▶ Phil will focus on the technical / European side
- ▶ Thanks to Daniela for arranging and chairing this meeting

# Goals for Today

- ▶ Kick-off meeting in April agreed:
  - ▶ There is broad interest in UK collaboration in strategic detector R&D
  - ▶ This is the route for seeking UK funding towards the ECFA programme
    - ▶ And, implicitly, for supporting work on detectors for future facilities
  - ▶ A formal overarching 'project' is required to obtain STFC funding
  - ▶ Tension with current and upcoming construction projects should be avoided
  - ▶ An asymptotic funding level of £5M per year is an appropriate ambition
- ▶ Next step: inaugurate Steering Board of all interested institutes
  - ▶ All UK experimental groups + STFC NLD have signed up, and here we are
- ▶ Goals for today
  - ▶ Agree to begin a formal collaboration / project in the UK
  - ▶ Identify convenors / WP managers in all areas of interest
  - ▶ Agree a process for funding top-level leadership of the project
  - ▶ Agree the timeline for next steps

# Strategic Detector R&D Proposal

- ▶ Original PPAP proposal attached to the agenda
- ▶ History to date: Europe
  - ▶ 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
- ▶ Note that a new roadmapping exercise will begin this year
  - ▶ We are therefore well placed to have the work formally recognised and funded

# 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’
  - ▶ It is true that R&D is in tension with construction projects
    - ▶ However, larger UK 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 – how much?
  - ▶ 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, additional resources are likely to become available post-2026
- ▶ £5M pa would allow for a coherent UK programme across a few DRD
- ▶ £10M pa would allow more scope and UK leadership in key areas
- ▶ Note that other countries are already spending more than this
  - ▶ And planning additional investment in the context of the European Roadmap

# UK Roadmaps

## ▶ PPAP

- ▶ Essential to have a **broad portfolio of projects** to efficiently balance R&D phases for future programmes from the dedicated production builds
- ▶ Maintaining a **balanced portfolio** is key to enabling technology and skills exchange
- ▶ The R&D activities relevant for the HL-LHC should serve as a basis for the detector development relevant for **future colliders**
- ▶ Investment in **appropriate R&D** on detector and accelerator technologies / systems ... will position us to take a **leading role** in  $e^+e^-$  collider physics
- ▶ Should maintain leadership during R&D, construction and exploitation of **Direct DM Detectors**
- ▶ STFC should facilitate **access to funding opportunities** for [basic R&D], where possible using external funding streams

## ▶ PAAP

- ▶ An effective and cost efficient mechanism could be to provide funding for **long-term technology development** in areas applicable to a larger number of the upcoming projects... **larger, technology-focussed grants** which could fund centres of excellence comprising either single or a **distributed network of institutes**.
- ▶ A new mode of **larger scale technology programmes** which would assemble expertise to develop high impact technologies with application across **multiple projects and fields**



# STFC and Funding

## ▶ Interactions with STFC

- ▶ Programme managers aware of this initiative, and kept updated
- ▶ Agreement to consider an SoI to Science Board (PPAN) around September
  - ▶ Timing is not fixed – but seems logical to summarise to SB the outcomes of the DRD proposals
- ▶ Nobody is guaranteeing funding in 2024/25 – but nobody is explicitly ruling it out yet either

## ▶ A ‘ramp-in’ approach

- ▶ Funding profile to match availability of experts, many of whom are busy...
- ▶ Start of the ramp may be students + TD engineering time
  - ▶ Allowing students to also gain experience on current projects from October 2023

## ▶ Bottom line (my opinion)

- ▶ Inconceivable that the UK should ignore the European R&D initiative
  - ▶ This would squander a long history of successful leadership in detector projects
  - ▶ Nobody in STFC disagrees, but ‘tensioning’ has to be done careful and via due process
- ▶ The community needs to continue to exert pressure on STFC
  - ▶ Via submission of SoI, via PPAP, and in the upcoming programme review
- ▶ If we do not start serious planning now, nothing will happen, by definition

## ▶ Additional facilities / infrastructure funding can be bid for via national labs

- ▶ Could provide medium-scale new facilities for national and international access
- ▶ e.g. test beams, cryostats, screening systems, detector labs & assembly facilities

# (Revised) Timeline

- ▶ **March 2023:** Participate in the DRD kick-off workshops in order to understand and influence the plans of the DRD collaborations – **complete**
- ▶ **April 2023:** inaugurate the steering board to confirm plans towards an SoI in September – **delayed, but happening today**
- ▶ **June 2023:** Bring together the plans from different areas to understand the potential scope of UK participation and define the initial scope of the programme. Form the working group to construct the SoI.
- ▶ **July 2023:** DRD proposals submitted (except DRD7) to DRDC
- ▶ **September 2023:** submit SoI to SB / STFC Visions
- ▶ **October 2023:** DRD7 proposal submitted to DRDC
- ▶ **Spring 2024:** UK peer review via PPRP?
- ▶ **October 2024 (if approved):** Project start
  - ▶ Ambitious time scale given the need to agree funding arrangements and recruit where necessary

# Progress in Planning

## ▶ Proto-convenors:

- ▶ DRD1 (gaseous detectors): P. Majewski / TBD (one volunteer)
- ▶ DRD2 (liquid detectors): R. Guenette / J. Monroe
- ▶ DRD3 (silicon detectors): J. Dopke / L. Gonella / D. Hynds / E. Villela
- ▶ DRD4 (PID): G. Wilkinson / TBD (one volunteer)
- ▶ DRD5 (Quantum sensors): TBD
- ▶ DRD6 (Calorimetry): I. Vivarelli / N. Watson
- ▶ DRD7 (Electronics): C. Fitzpatrick / K. Potamianos / M. French / TBD
- ▶ Low-background materials: P. Scovell / R. Saakyan

## ▶ Rate of progress varies between areas

- ▶ Active discussions in DRD2, DRD3, DRD1
- ▶ Starting serious discussions in DRD4, DRD7, DRD6

## ▶ UK Tracker Strategic R&D Workshop

- ▶ 26-27 June at Liverpool; focus on DRD3 + DRD7 areas

# What Next?

## ▶ Next actions:

- ▶ Debate and agree timeline
- ▶ Confirm convenors, find people where none are active
- ▶ Identify the PI / management team that will get the SoI together

## ▶ Personal note

- ▶ I have to remove myself from the picture at this point for obvious reasons
- ▶ I will continue to emphasise the strategic importance of this programme within STFC
- ▶ Essential to tie together work in the groups and in the labs to generate impact for the widest set of beneficiaries
  - ▶ PP / PA, allied subjects, large scale facilities, other science areas, industry, etc etc...