

# New CERN R&D framework and UK strategic R&D plans including discussion

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# Towards the new 'Detector R&D' collaborations...

## ▪ 2021 ECFA Detector R&D Roadmap

- Developed by the community to balance the detector R&D efforts in Europe
- Highlighted the need for a new R&D phase in the form of DRD collaborations
- To enhance the performance of the particle physics programme in the near and long term

**ECFA R&D Roadmap**  
([link here](#))



## DETECTOR RESEARCH AND DEVELOPMENT THEMES (DRDTs) & DETECTOR COMMUNITY THEMES (DCTs)

From 01.01.2024

Gaseous	DRDT 1.1	Improve time and spatial resolution for gaseous detectors with long-term stability
	DRDT 1.2	Achieve tracking in gaseous detectors with $dE/dx$ and $dN/dx$ capability in large volumes with very low material budget and different read-out schemes
	DRDT 1.3	Develop environmentally friendly gaseous detectors for very large areas with high-rate capability
	DRDT 1.4	Achieve high sensitivity in both low and high-pressure TPCs
Liquid	DRDT 2.1	Develop readout technology to increase spatial and energy resolution for liquid detectors
	DRDT 2.2	Advance noise reduction in liquid detectors to lower signal energy thresholds
	DRDT 2.3	Improve the material properties of target and detector components in liquid detectors
	DRDT 2.4	Realise liquid detector technologies scalable for integration in large systems
Solid state	DRDT 3.1	Achieve full integration of sensing and microelectronics in monolithic CMOS pixel sensors
	DRDT 3.2	Develop solid state sensors with 4D-capabilities for tracking and calorimetry
	DRDT 3.3	Extend capabilities of solid state sensors to operate at extreme fluences
	DRDT 3.4	Develop full 3D-interconnection technologies for solid state devices in particle physics
PID and Photon	DRDT 4.1	Enhance the timing resolution and spectral range of photon detectors
	DRDT 4.2	Develop photosensors for extreme environments
	DRDT 4.3	Develop RICH and imaging detectors with low mass and high resolution timing
	DRDT 4.4	Develop compact high performance time-of-flight detectors
Quantum	DRDT 5.1	Promote the development of advanced quantum sensing technologies
	DRDT 5.2	Investigate and adapt state-of-the-art developments in quantum technologies to particle physics
	DRDT 5.3	Establish the necessary frameworks and mechanisms to allow exploration of emerging technologies
	DRDT 5.4	Develop and provide advanced enabling capabilities and infrastructure

- The roadmap identified several R&D themes
- Critical to achieve the scientific programme in the ESPP (European Strategy for Particle Physics)
- Derived from the technological challenges that need to be overcome for the scientific potential of the future facilities

Calorimetry	DRDT 6.1	Develop radiation-hard calorimeters with enhanced electromagnetic energy and timing resolution
	DRDT 6.2	Develop high-granular calorimeters with multi-dimensional readout for optimised use of particle flow methods
	DRDT 6.3	Develop calorimeters for extreme radiation, rate and pile-up environments
Electronics	DRDT 7.1	Advance technologies to deal with greatly increased data density
	DRDT 7.2	Develop technologies for increased intelligence on the detector
	DRDT 7.3	Develop technologies in support of 4D- and 5D-techniques
	DRDT 7.4	Develop novel technologies to cope with extreme environments and required longevity
	DRDT 7.5	Evaluate and adapt to emerging electronics and data processing technologies
Integration	DRDT 8.1	Develop novel magnet systems
	DRDT 8.2	Develop improved technologies and systems for cooling
	DRDT 8.3	Adapt novel materials to achieve ultralight, stable and high precision mechanical structures. Develop Machine Detector Interfaces.
	DRDT 8.4	Adapt and advance state-of-the-art systems in monitoring including environmental, radiation and beam aspects
Training	DCT 1	Establish and maintain a European coordinated programme for training in instrumentation
	DCT 2	Develop a master's degree programme in instrumentation

# Areas of ‘Detector R&D’

- **Strategic R&D via DRD Collaborations**

- Long-term strategic R&D lines
- To address the high-priority items defined in the Roadmap via the DRDTs

- **“Blue-sky” R&D**

- Competitive
- Short-term responsive grants
- Nationally organised

- **Experiment-specific R&D**

- With very well defined detector specifications
- Funded outside of the DRD programme, via experiments

# Timeline for establishing the new DRD Collaborations

**Q4 2022**

- **DRD proposal teams** formed to lead the preparation of the DRD proposals in each area

**Q1 2023**

- Each DRD proposal team calls for expressions of interest from institutes and **community workshops** take place
- DRDC membership appointments begin

**Q2 2023**

- The **new DRD proposals are developed** based on the detector roadmap and community interest
- Mechanisms **agreed with funding agencies** for structuring country-specific DRD collaboration funding requests

# Timeline for establishing the new DRD Collaborations

- Q3 2023**
  - **The DRD proposal teams submit full DRD Proposals**, including estimates of the resources needed
- Q4 2023**
  - Following the review and revision (if required) of proposals, the DRDC recommends the formal establishment of the DRD collaborations
  - Formal **approval** is given by the CERN Research Board
- 2024**
  - **Collection of MoU signatures**

**Formal start of the DRD Collaborations  
(01.01.2024)**

(End of current RD Collaborations)



# DRD3

## Implementation of TF3 Solid State Detectors

22-23 Mar 2023  
CERN  
Europe/Zurich timezone

Overview

Timetable

Wed 22/03 Thu 23/03 All days

# DRD2

## Implementation of TF2 Liquid Detectors. – 20 April 2023 (Remote Meeting)

1 Jan 2023, 09:00 → 20 Jun 2023, 11:00 Europe/Zurich

Description We are hosting a fully remote event on 20 April from 11AM to 6PM CEST. We will connect via zoom: [zoom link](#)

->PLEASE REGISTER if you are interested in the DRD2 event you later with your details.

## Implementation of TF4 Photon Detectors and PID

1 January 2023 to 20 June 2023  
Europe/Zurich timezone

Overview

Timetable

Registration

### Short Chronology of actions

- Peter Krizan (JSI) published the creation of DRD4 on PID experts.
- A first meeting was held with PID experts.
- The links to 2 questions need your input/feedback on the indico site (on the indico site).
- A live community meeting on scientific and organizational aspects.
- Stay posted! Please

Starts 1 Jan 2023  
Ends 20 Jun 2023  
Europe/Zurich

Christian Joram  
Peter Krizan  
Peter Krizan

Registration

View as list

# DRD4

## Workshop on establishing the DRD5 / RDq collaboration for Quantum Sensing detector R&D

Thursday 12-Jan-2023 09:00 - 18:00 Europe/Zurich

222/R-001 (CERN)  
Roman Popov

Registration

Participants

Introduction to Quantum Sensing (TF5) has identified six researchers in the field of Quantum Sensing to form a dedicated collaboration

# DRD5

## ECFA Detector R&D Roadmap Task Force

Thursday 12-Jan-2023 09:00 - 18:00 Europe/Zurich

222/R-001 (CERN)  
Roman Popov

Registration

Participants

Implementing DRD7: an R&D Collaboration on Electronics and On-detector Processing

14-15 Mar 2023  
CERN  
Europe/Zurich timezone

Registration

Participants

Overview

Timetable

Contribution List

Registration

# DRD6

Registration

Participants

Overview

Timetable

Contribution List

Registration

# DRD7

# DRD1

## DRD1 Community Meeting

1-3 Mar 2023  
CERN  
Europe/Zurich timezone

Timetable

Wed 01/03 Thu 02/03 Fri 03/03 All days

General WG1: Technologies WG2: Applications WG3: Gas and material studies

09:00 ECFA Roadmap and implementation

09:00 DRD1 Survey

10:00 Coffee break

10:00 Introduction

10:00 Analysis of the Survey

Series of workshops during the first half of 2023 to organise the communities towards forming the new collaborations

DRD8 felt their area is too experiment specific to be the topic of a "Strategic R&D" bid. DRD9 is taken care of by a new ECFA Training Panel while.

# Strategic Detector R&D Proposal in the UK

**UK Strategic R&D Management Meeting**

Tuesday 21 Feb 2023, 14:00 → 17:20 Europe/London

RAL

Description RAL room CR11 (building R3)

<https://www.isis.stfc.ac.uk/Pages/ral-site-map.pdf>

Zoom <https://ukri.zoom.us/j/96099485867>

**14:00** → 14:05 **Welcome and site briefing**  
Speaker: Dave Newbold (STFC)

**14:05** → 14:25 **Background and purpose of the meeting**  
Speaker: Dave Newbold (STFC)

(Final) UK Strategic ... Intro2.pdf

**14:25** → 14:45 **Progress in ECFA R&D planning**  
Speaker: Phil Allport (Birmingham)

UK\_ECFA\_Roadmap...

**14:45** → 15:05 **Discussion on next steps** 20m

**15:05** → 15:15 **Report on DRD1 discussions / plans** 10m  
Speaker: Pawel Majewski et al

DRD1.pdf

**15:15** → 15:25 **Report on DRD2 discussions / plans** 10m

- First meeting to review research interests in the UK and establish how we will **collectively generate an SOI and following proposal**
- SOI to be submitted in **September 2023**
- Proposal matched (in principle) to the scope of the European Roadmap

[Meeting link](#)



## UK Tracker Strategic R&D

📅 26 Jun 2023, 10:00 → 27 Jun 2023, 18:00 Europe/London

👤 Daniel Hynds (University of Oxford) , Eva Vilella (University of Liverpool) , Jens Dopke (STFC) , Laura Gonella

- **Workshop to shape the strategic UK R&D programme on solid state detectors** within the international DRD3 and DRD7 collaborations, and the proposal that will later be submitted to STFC
- **26-27 June in Liverpool**