DRD3 Solid state detectors

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DETECTOR RESEARCH AND DEVELOPMENT THEMES (DRDTs) & DETECTOR COMMUNITY THEMES (DCTs)
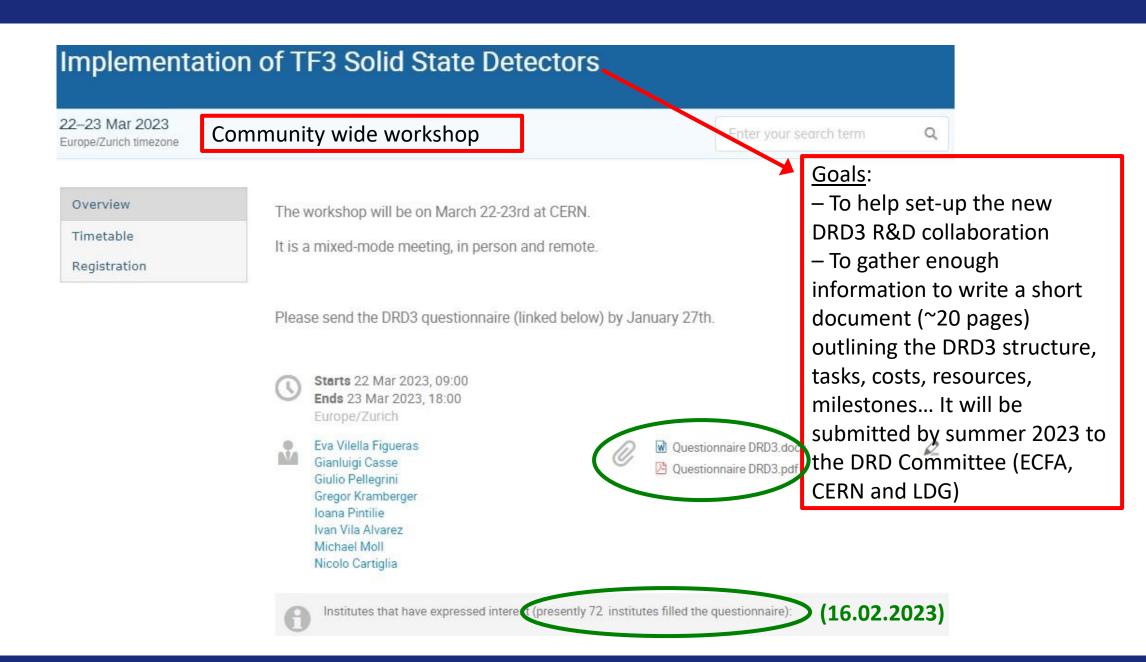
From 01.01.2024

ECFA R&D Roadmap (link here)

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

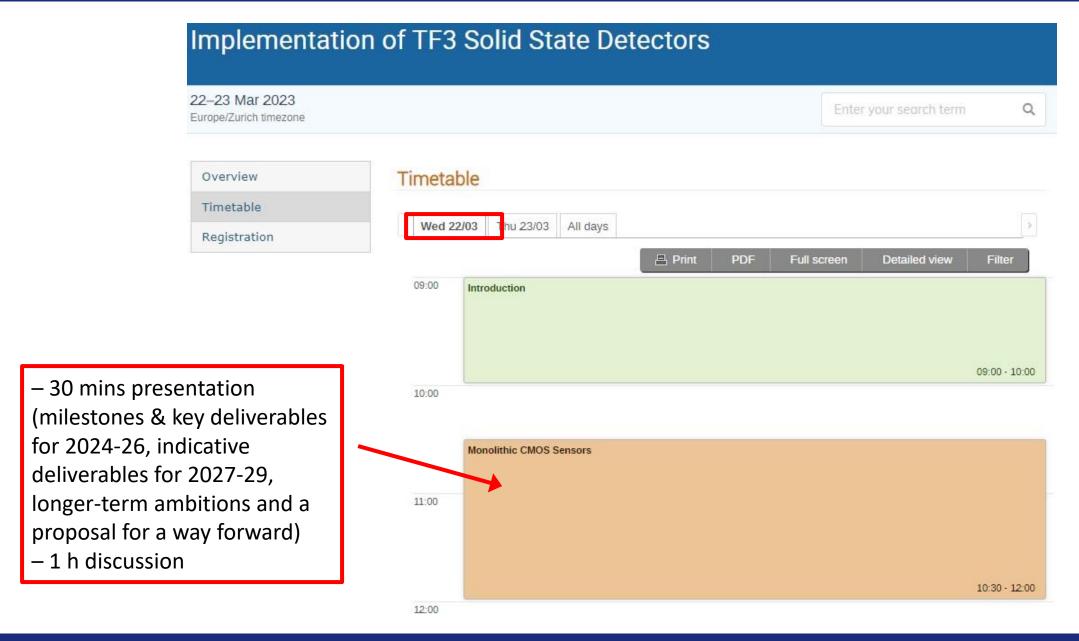|	
DRDT 5.1	Promote the development of advanced quantum sensing technologies
DRDT 5.2	Investigate and adapt state-of-the-art developments in quantum technologies to particle physics
DRDT 5.3	Establish the necessary frameworks and mechanisms to allow exploration of emerging technologies
DRDT 5.4	Develop and provide advanced enabling capabilities and infrastructure

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

DRD3 - Themes

- **DRD3.1** Monolithic CMOS sensors
- **DRD3.2** Sensors for tracking and calorimetry with space, time and/or energy resolution
- **DRD3.3** Radiation damage and ultra-high fluences
- **DRD3.4** Simulations
- **DRD3.5** New characterisation techniques and facilities of common interest
- **DRD3.6** Non-silicon semiconductor and other material studies
- **DRD3.7** Interconnect and device fabrication technologies
- **DRD3.8** Dissemination and outreach
- **DRD3.9** Proposal for organisation and anticipation of MoU of the new collaboration

Implementation of TF3 Solid State Detectors

22–23 Mar 2023
Europe/Zurich timezone

Community wide workshop

Enter your search term 🔍

- Overview
- Timetable
- Registration

The workshop will be on March 22-23rd at CERN.

It is a mixed-mode meeting, in person and remote.

Please send the DRD3 questionnaire (linked below) by January 27th.

🕐 **Starts** 22 Mar 2023, 09:00
Ends 23 Mar 2023, 18:00
Europe/Zurich

👤 Eva Vilella Figueras
Gianluigi Casse
Giulio Pellegrini
Gregor Kramberger
Ioana Pintilie
Ivan Vila Alvarez
Michael Moll
Nicolo Cartiglia

📎 📄 Questionnaire DRD3.doc
📄 Questionnaire DRD3.pdf

ℹ️ Institutes that have expressed interest (presently 72 institutes filled the questionnaire): **(16.02.2023)**

Goals:
– To help set-up the new DRD3 R&D collaboration
– To gather enough information to write a short document (~20 pages) outlining the DRD3 structure, tasks, costs, resources, milestones… It will be submitted by summer 2023 to the DRD Committee (ECFA, CERN and LDG)

– 30 mins presentation (milestones & key deliverables for 2024-26, indicative deliverables for 2027-29, longer-term ambitions and a proposal for a way forward)
– 1 h discussion

DRD3 – Questionnaire

- To gather input for the community wide workshop
  - Research interests
  - Tools
  - Resources

- One questionnaire per institute

- Requested in January 2023

- ~72 questionnaires received (16.02.2023)
  - Most questionnaires in line with the roadmap guidelines
  - Many expressed interest in CMOS!!

DRD3 – Facilitator teams

- **One facilitator team per DRD theme:**
  - To study the questionnaires and present an overview of the community interests at the workshop
  - To present an R&D plan with milestones (following the ECFA Detector R&D Roadmap guidelines) and costings
  - To assess available funds and resources
  - To get feedback from the community
  - To write a DRD3 proposal document