
DRD1 Work Package 6

Photons

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DRD1 Community Meeting

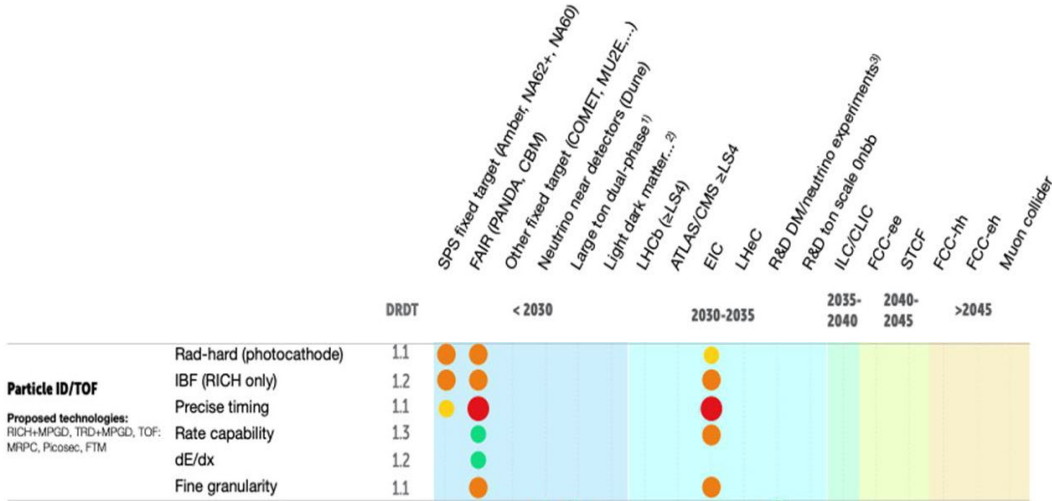
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Work Packages

DRDT		Applications	Link to WG activities	Milestones/interested institutions	
DRDT1.3	DRDT1.2	DRDT1.3	Inner and central tracking with PID capability	<ul style="list-style-type: none"> • Tools/infrastructures (WGs) 	<ul style="list-style-type: none"> • Task1 – Milestones, Institutions • Task2 – Milestones, Institutions •
		Photo-detectors (PID)	<ul style="list-style-type: none"> • Tools/infrastructures (WGs) 	<ul style="list-style-type: none"> • Task1 – Milestones, Institutions • Task2 – Milestones, Institutions • 	
		Timing detectors (PID and trigger)	<ul style="list-style-type: none"> • Tools/infrastructures (WGs) 	<ul style="list-style-type: none"> • Task1 – Milestones, Institutions • Task2 – Milestones, Institutions • 	
		Genuine Trackers/Hodoscopes (large area muon systems, inner tracking/vertexing)	<ul style="list-style-type: none"> • Tools/infrastructures (WGs) 	<ul style="list-style-type: none"> • Task1 – Milestones, Institutions • Task2 – Milestones, Institutions • 	
		Calorimetry	<ul style="list-style-type: none"> • Tools/infrastructures (WGs) 	<ul style="list-style-type: none"> • Task1 – Milestones, Institutions • Task2 – Milestones, Institutions • 	
	DRDT1.4	TPCs as reaction and decay chambers (rare events, neutrino physics, nuclear physics)	<ul style="list-style-type: none"> • Tools/infrastructures (WGs) 	<ul style="list-style-type: none"> • Task1 – Milestones, Institutions • Task2 – Milestones, Institutions • 	

WP6: Photo-detectors

(PID)



Challenges/tasks

- Preserve the photocathode efficiency by IBF and more robust photoconverters
- Very low noise, large dynamic range of the FEE
- Separate the TR radiation and the ionization process

Discussion

- **Open discussion:** WP6 presented scenario → final proposal may be very different
- 31 Institutes expressed interest in WP6 topics in the survey and/or community feedback
- Institutes from:
Brazil, China, Croatia, Finland, France, Germany, Hungary, India, Israel, Italy, Poland, Portugal, Spain, Switzerland, Turkey, United Kingdom, USA
- **Interest → contribution → project responsibility within the WP**
- Total freedom of choices, but some coherence and coordination will be needed.

Institutes:

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Discussion

- Areas of interest are broad and interconnected with other WPs (even in other DRDs):
 - IBF suppression, novel photoconverters, ...
 - generation of photons, electroluminescence, photon amplification, optical readout, ...
 - specific FEE

6 identified TASKS:

T1: Photoconversion

T2: IBF suppression

T3: Gas studies

T4: Frontend Electronics

T5: Enhance mechanics

T6: precision measurements

WP6: Photo-detectors

#	Task	Performance Goal	DRD1 WGs	ECFA DRDT	Comments	Deliv. next 3y	Interested Institutes
T1	Increase photocathode efficiency and develop robust photoconverters	Improve: - Longevity - QE - Extend to the visible range - Rad-hardness up to 10^{11} n_{eq}/cm^2	WG3 (3.1C), WG6, WG7 (7.1-4)	1.1	- Study hydrogenated nanodiamonds - Study diamond-like carbon (DLC)	- Demonstrate the performance of nanodiamond-powder photocathodes in terms of their chemical reactivity and ageing - Provide a detailed characterization of QE of new photocathode materials, e.g. DLC	INFN-TS, CERN, HIP, IRFU/CEA, NISER Bhubaneswar, U Coimbra, LMU, U Aveiro, RBI, Wigner
T2	IBF suppression, discharge protection	- IBF reduction down to 10^{-4} and below - Stable, high gain operation up to 10^5 - 10^6 - Operation in magnetic field	WG4, WG7 (7.1,5)	1.2	- Multi-Micromegas detectors - Zero IBF detectors - New structures (Cobra, M-THGEM,) and coating materials (Mo) - Grids: bi-polar grids, gating GEM	- Demonstrate a small-area new structure or stack of structures providing stable operation at high gains and low IBF performance	USTC, INFN-TS, INFN-PD, INFN-PV, TUM, WIS, U Bonn, HIP, IRFU/CEA, NISER Bhubaneswar, CERN, MSU, SBU, JLab, BNL, U Coimbra, IP-PLM, U Aveiro, RBI
T3	Gas studies	- Develop eco-friendly gas radiators and, in particular, explore alternatives to CF_4	WG3 (3.2A), WG4, WG7 (7.2,4)	1.1, 1.3	- Identification of eco-friendly gas mixtures free from greenhouse gases - Alternatives to CF_4 for optical readout		CERN, NISER Bhubaneswar, HUJI, GSSI, INFN-PD, INFN-TS, AGH-Krakow, IPPLM, USC/IGFAE, U Aveiro

WP6: Photo-detectors



#	Task	Performance Goal	DRD1 WGs	ECFA DRDT	Comments	Deliv. next 3y	Interested Institutes
T4	FEE	<ul style="list-style-type: none"> - Stability at high input capacitance - Low noise - Large dynamic range 	WG5	1.2		- Present an ASIC concept/prototype	IFUSP, NISER Bhubaneswar, INFN-PD, INFN-TS, AGH-Krakow, IPPLM, U Manchester, MSU, SBU, JLab, DIPC
T5	Enhance mechanics	<ul style="list-style-type: none"> - High-pressure operation - Improve gas tightness 	WG6	1.3			NISER Bhubaneswar, HUJI, GSSI, USC/IGFAE, CERN, MSU, JLab, DIPC, IPPLM, RBI
T6	Precision measurements	<ul style="list-style-type: none"> - Time resolution ≤ 100 ps - Spatial resolution ≤ 1 mm 	WG7.2		- MPG: PICOSEC		CERN, IPPLM

Interconnections



- Discussion within WP6 and with other DRD1 WPs in the interconnected areas
- Discussion with other DRDs: dedicated session of this Community meeting tomorrow
- The starting and the content of WP6 is decided by the proponents.