IF02:Photodetectors

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Summary

- Conveners have converged on the groupings of the LOIs into categories that are technology centered/cross cutting across frontiers.
  - Each category becomes a subgroup/white paper writing team. Expect 8-10.
  - Finalizing a few threads that were pending before we went in hiatus.
  - Some categories/LOIs have already been moved to other groups (greyed).
- Conveners will start meeting regularly to begin organizing communications with the proponents to promote white paper teams.
  - We expect kickoff white paper mini-workshops starting late October.
  - Planning workshop early next year late January - early February.

	Neutrino Frontier 1	Cosmic Frontier 2	Energy Frontier 3	Rare & Precision 4
Sensors hiE(1)		●		
Sensors UV (2)	●	●		●
Sensors VIS (3)	●	●	●	●
Sensors IR (4)		●		
Sensors μwave/Radio (5)		●		
Large Area (6)	●			●
Low Background (7)				●
Fast Timing (8)	●	●	●	
Light collection (9)	●	●		●
RD facility (10)				

New sensors high-energy

Development of novel photosensor technology above UV energies. This focus mainly in Gamma ray instrumentation for space.

LOI ~ 2

New sensors UV

Development of UV and VUV detectors sensor for noble liquids (light and charge collection), calorimetry and Cherenkov imaging (Particle ID). With some overlap in BES.

LOI ~ 4

New sensors visible and IR

Development of new photon sensors for visible light. Semiconductor detector (CCD, CMOS, SiPM) for use in the next generation of experiment in all frontiers in HEP. This area includes single photon imaging devices, IR semiconductor devices (like Ge imaging detectors), images with integrated processing (3D integration).

Also SNSPDs.

LOI ~ 16

WP candidates:

- semiconductor imagers
- Ge detectors
- SNSPDs

Detector for microwaves

Development of new sensor technologies for microwaves that do not have the focus on quantum techniques on quantum sensing. This includes for example Microwave Kinetic Inductance detectors, other photon detection for axion experiment and new materials for low energy photon detection.

We have moved the radio astronomy detectors to the new IF10 group.

LOI ~ 4

Large area photodetectors

Development of cost efficient solutions covering large areas for photon detection in HEP experiments, cosmic, nuclear physics and radiation therapy.

LOI ~ 3

Photodetectors with fast timing

Focused on the photodetector with fast timing (psec) in colliding experiments, neutrino experiments. LGAD, psec timing in sub-micron CMOS, fast timing in calorimeters...

LOI ~ 7

Light collection systems

Technology developments for astronomical spectrographs (fiber positioners), light collecting systems and filtering in next generation neutrino detectors.

Diverse group.

LOI ~ 8

WP candidates:

- light technologies for astronomy
- light collection for particle detectors

Plan

- The conveners will start meeting regularly (~ biweekly).
- The next step for us is to communicate with the LOI writers to organize these mini-workshops during October. We also need to understand what has happened over the last year to include efforts/ideas not included in the 2020 LOIs.
- We expect a photodetector workshop in January-February 2022, to start talking about the progress on the white papers.

Summary

We have identified 7 working areas, which could produce something about 10 white papers. Most of the LOIs fit inside these groups, and we have done a most of the work on the interface with IF01 (quantum) and IF10 (radio). We will have a mini workshop in the coming months to converge on teams writing white papers.

It looks like an opportunity to identify and leverage technological synergies in the different scientific frontiers to advance instrumentation needs in an efficient way.