PID & Photo-detector Summary & Consideration

Angela Romano 04/06/2021
University of Birmingham

angela.romano@cern.ch

PID & PD R&D Summary

- RICH detectors play, and will continue to play, pivotal role in UK HEP
- Several areas of dedicated R&D in UK for RICH, synergies and potential to attract funding from other sources
- UK ongoing involvement in TOF for PID in LHCb and future e+e- colliders
- PD R&D for TORCH has synergy with the LHCb RICH and future Kaon facilites
- Future facilities requirements are challenging current technology for PD - time resolution one of the key points
- UK groups actively involved in R&D on PDs and many opportunities for the future!
- The UK is well engaged in PD R&D for LXe detectors, not so much by developing new devices but by working closely with manufacturers – on requirements, backgrounds, device testing, etc.
- UK involment in R&D on SiPM for LAr experiments (DUNE-DarkSide20k)
- Opportunity to ensure leadership in the next generation of experiments (ARGO, DUNE MoOD, also VD)

Strengths and Weaknesses

- Huge expertise and history in detector development
- Facilities and infrastructure (RAL, Boulby, ADDC) advantages
- A variety of R&D efforts with UK involvement in colliders, flavour, DM & neutrino. Some areas of expertise where UK is leading, others where it could be leading, or unexplored but with potential
- For Photon Detectors few manufacturers are holding all intellectual properties
- In most cases technologies dedicated to particle physics and specific specs do not meet the requirement for mass production and are ignored by industry and overly priced
- Can improve collaboration/coordination of university/institutions towards industrial partners
- More ambitious programmes where the UK gains IP – requires well-funded and sustained R&D

Problems & Suggestions

- In general direct connection between individuals and industry makes the process less effective, more time consuming on both sides, less synergizing, more expensive and overall less efficient
- Instance of R&D collaboration/consortium of experts collecting the requirements/specs for all areas of experiments/particle physics
- The consortium identifies synergies, urgencies, opportunity for growth/development and acts in the community interest as a contact with the industrial partner
- Allowing funds and investments towards co-development costs can create the base for mutual benefits, facilitate R&D activities, and secure the commitment from suppliers.
- R&D experimental testing activities in labs suffer from lack of dedicated R&D fund streams - R&D is often funded under the umbrella of larger projects in exploitation phase (e.g., upgrades for LHC experiments).
- Support the instantiation of dedicated calls for R&D funding at UK level (Project Research and Development Scheme?)
- A structure of yearly fixed-terms funding calls specific to R&D (outside the consolidated grants) and of different capacities, to allow detector R&D from concept-ideas to prototype and big-scale projects.
- Funding calls dedicated to R&D and for Uni/Industry collaborations with handles/means to incentivise relations and maximise results on a time/cost/value base.

Result of Community Consultation (Prior the workshop)

- The R&D in photo-detectors is always in collaboration with industrial partners and one way to best facilitate the process would be to improve the interactions/relations.
- There is no diversity of PD suppliers and there are no many manufacturers (Hamamatsu, Photonis, Photek, ...)
- As a consequence the advances in PD are dependent on the approachability, relations, interactions and commercial benefits of few dominant companies, of which only one is UK based.
- Moreover Particle Physics represents a small market with sometimes specific requirements.
- Allowing funding and investments from the community towards co-development costs will create the base for mutual benefits, facilitate the R&D activities, and ideally securing the commitment from suppliers whether a synergy is found or not.
- More specifically to the UK, R&D experimental testing activities in labs suffer from lack of dedicated R&D fund streams - R&D is often funded under the umbrella of larger projects in exploitation phase (e.g., upgrades for LHC experiments).
- Support the instantiation of dedicated calls for R&D funding at UK and EU levels.
- Possible Suggestion: UK groups can join forces and put together a UK consortium to talk with the few relevant industrial partners.