Science and Technology Facilities Council

STFC Early-Stage research and development scheme: Intention to submit (ItS)

To apply for the STFC Early-stage research and development scheme, all applicants are required to complete the below pro forma and submit it to **KEGroup@stfc.ac.uk**

Please title the email **Early-Stage research and development scheme ItS**

Any applications received which have not submitted this this version of the form will not be accepted.

These ItS will be assessed internally by a sift panel who will determine if the project is eligible for the scheme. They will determine if

- the applicant and lead institution meets the STFC criteria for holding a grant.
- the project TRL is suitable for the scheme
- the project has been developed from STFC science and fits within the STFC remit
- the project is of potential benefit to the PPAN community and/or the wider UK community

Applicant details

Lead applicant name:	Fabrizio Salvatore
Lead applicant e-mail:	p.f.salvatore@sussex.ac.uk
Lead institution:	University of Sussex

If the project is planned as part of a larger collaboration, please state the names and affiliations of all partner organisations	University of Sussex (UK): Fabrizio Salvatore International partners: University of Bologna (Italy): Iacopo Vivarelli University of Insubria, Como (Italy): Romualdo Santoro University of Pavia (Italy): Gabriella Gaudio, Roberto Ferrari
Project details	Electronics for test beam R&D of dual-readout prototypes
Please state the proposed title of the project:	R&D tests for Dual-Readout Calorimeter applications

Please mark with an X the relevant box, stating the remit area you work in

Quantum Science	Particle physics	Astronomy	Particle astrophysics	Solar and planetary science	Nuclear Physics	Accelerator science	Supporting Computing science	Other (please state)
	X							

Please mark with an X the relevant box, stating the remit area the project is looking to target

Quantum Science	Particle physics	Astronomy	Particle astrophysics	Solar and planetary science	Nuclear Physics	Accelerator science	Supporting Computing science	Other (please state)
	X							X-rays and cryo-electron microscopy

Please provide a brief (less than 300 words) overview of the project, including high level aims and objectives
In 2022 and 2023 the Dual Readout collaboration has performed two very successful campaigns of beam test for a prototype of a calorimeter using the dual-readout technology, resulting in several publications (most recently: https://arxiv.org/abs/2305.09649). The UK had a leading contribution in the campaign through the participation to the data taking and the analysis of the test beam data. Continuation of this participation in the future, with additional PDRA effort on the project, would be key to keep UK leadership on this alternative technology for calorimeter detectors. The proponent aims to continue to contribute to this effort by providing electronics for SiPM readout, as well as conduct testing of the full readout chain (Optical Fibres -> SiPMs -> readout electronics) to measure attenuation length of the fibres, as well as time resolution, bias voltage, quantum efficiency and gain of the detectors. It would also be crucial to continue with the participation in the test beam data taking.

Please provide a brief (less than 300 words) overview of • who the project will benefit • how the project has been developed from STFC science and technology
The project will benefit the DRD efforts, both in the UK and internationally, by participating in the R&D of an alternative technology for new calorimeter detectors (the dual-readout technology), which has been identified as one of the possible technologies for future collider detectors. It proposes a strategic involvement in this dual-readout R&D project, in which the UK already has had leading involvement via the proposer at the University of Sussex (mainly through AIDAInnova funds), at modest cost to STFC.