

Status of the GRADE Programme (Generic pre-R&D at IdeaSquare)

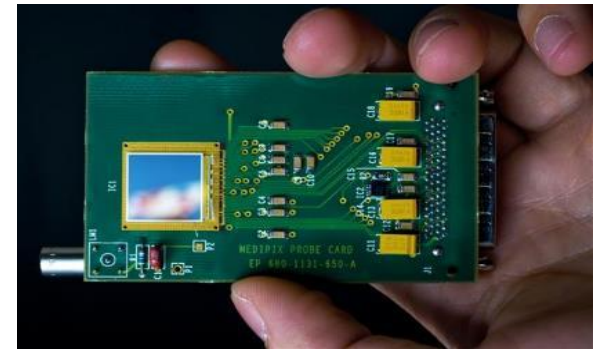
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GRADE MoU: Short Reminder

Pre-R&D and training on detector and related technologies at IdeaSquare (B3179)

- Approved by the RB in Dec 2015 for early-stage R&D efforts on new promising detector concepts and technologies for possible use in future experiments (hi-lumi LHC, ILC, FCC...).
- Strong educational involvement to explore potential future use also outside HEP, e.g. in society, including industry and students.
- Participating institutes (also from outside HEP) contribute as in-kind. It requires institutes to spend time at IdeaSquare to design, build prototypes, test, integrate, prepare TDRs etc.).



GRADE:

Currently two active projects

TT-PET (COMPLETED); NEW INITIATIVE 100 μ PET; NEW MoU)

- To develop a demonstrator for a ToF PET Scanner with a chip of matrix of 3x10 pixels with efficiency larger than 99.9% and a time resolution down to 110ps;
- Involving testing and student presence at IdeaSquare;
- Main partners: Geneva, HUG, Bern
- Has received 1.9 MCHF from SNSF, funding period ended
- Has achieved the set goals and is currently seeking for additional funding. Geneva continues one thread with a received ATTRACT grant. Requested extension to EoY 2020.
- Examples of related publications:
- G. Iacobucci,, R. Cardarelli,, S. Débieux, F.A. Di Bello, Y. Favre, D. Hayakawa, M. Kaynak, M. Nessi, L. Paolozzi, H. Rücker, DMS Sultan, and P. Valerio. A 50 ps resolution monolithic active pixel sensor without internal gain in SiGe BiCMOS technology. Prepared for submission to JINST

HEALTH (EXTENDED IN 2020 -2021)

- To develop a radon dose monitor, and a GEMPix-based integrated system for measurement of the 3D energy deposition in water by proton and C-ion beams for medical applications;
- Involving two PhD students at IdeaSquare working on the two prototypes;
- Has received two related ATTRACT grants for further developing GEMPix
- Requested extension to EoY2020
- Main partners: CIRA, ISS
- Examples of related publications:
- S. Romano, M. Caresana, A. Curioni and M. Silari, RaDoM2: an improved radon dosimeter, submitted for publication in JINST
- J. Leidner, M. Ciocca, A. Mairani, F. Murtas and M. Silari, A GEMPix-based Integrated System for Measurements of the 3D Energy Distribution in a Water Phantom for Carbon Ion Beam Therapy, to be submitted for publication in Medical Physics



GRADE: Summary Status in 2021

HEALTH to continue at ID2

- Water Phantom being tested, to make some modifications to house the Large Area GEMPix, then to be sent back to CNAO

TT-PET ended; has transformed into a new project with new partners

- Fresh funding (3.1MCHF) from the Swiss National Research Foundation for the continuation of the TT-PET (the project name is now **100 μ PET**).
- Project partners have changed and are now Martin Walter of HUG and Michaël Unser of EPFL
- Production of a version of the electronics for cryogenic temperatures

CBI has been approved by the CERN Research Board last summer (meeting minutes attached); no agreements yet signed due to COVID

ATTRACT:

Selected Projects involving CERN

Proposal Number	Title	Coordinator	
		Name	Surname
700	O-possum II (Positronium surface scanning microscopy)	Michael	Doser
451	Integrated Signal Processing for a New Generation of A	David Gascon	Gascon
	Smart Wall Pipes and ducts	Sebastien Lani	Lani
	GEMTEQ	Marco	Silari
	SMART (Supersensitive Multipurpose Advanced Radiat	Francesco	Pietropaolo
952	Hybrid High-precision In-vivo Imaging in Particle Thera	Piergiorgio	Cerello
493	HIOS: Heterogenous I/O for Scale	Viktor	Khristenko
197	SiPhoSpace - Radiation-tolerant high-speed optical dat	Jan	Troska
843	Radiation Dosimetry with Fiber Optic Sensors	Francesco	Fienga
251	Low Temperature Communication Link - LTCL	Daniel	Calcoen
	LaGEMPix	Marco	Silari
1103	Development and Application of Versatile Highly UV F	Stephan	Malbrunot
150	FASTPIX	Walter	Snoeys
720	Development of radiation-hard and cost â€“effective i	Hans	Zaunick
259	Detection of DC beams using electro-optical crystal and	Michal	Krupa
101	Quantum Optimization of Worldwide LHC Computing C	Anita	Bens
151	The Curious Cryogenic Fish (CCF)	Giovanna	Lehmann Miotto
586	Nano-photonics applied to ultrafast single photon qua	Matteo	Salomoni
855	Ultra High-level Radiation Monitoring with Thin Metal	Federico	Ravotti