



DarkSide @ TIFPA

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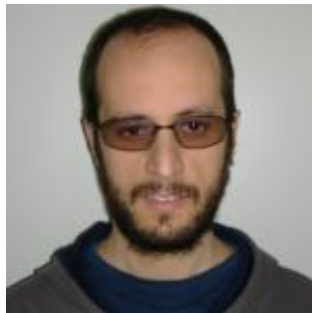
The group



Priyanka Kachru



Alberto Gola



Andrea Ficorella



Laura Parellada
Monreal



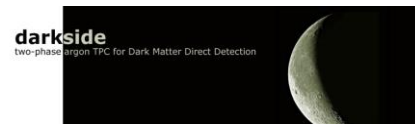
Giovanni
Paternoster



Stefano Merzi
DarkSide-20k at TIFPA

DarkSide-20k

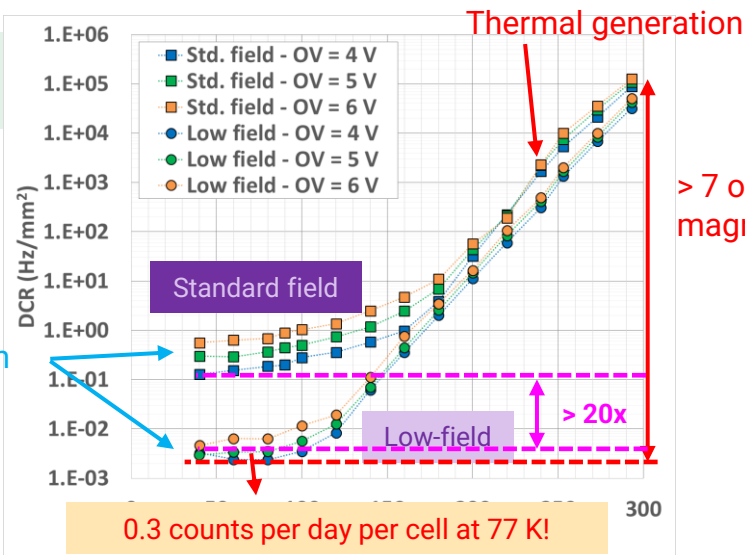
Detector R&D and Photon Detection Module



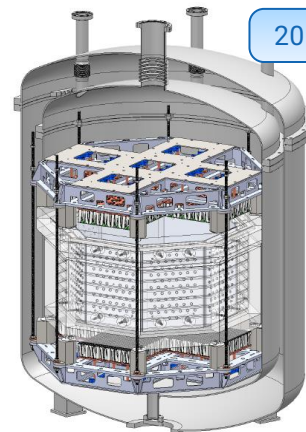
NUV-HD-Cryo SiPM technology is an *enabling technology for the DarkSide-20k* experiment, currently under construction.

25 μm cell

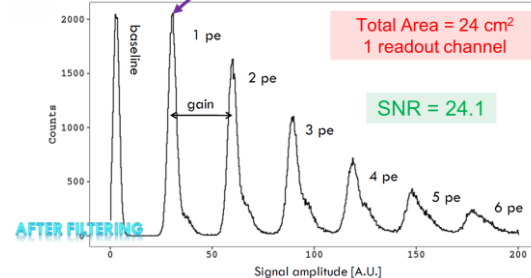
Tunneling



> 7 orders of magnitude!



Good gain uniformity of $\sim 3\text{M}$ SPADs at 77 K



Darkside-20k experiment under construction at LNGS using FBK SiPMs fabricated at Lfoundry: 20 m² of SiPMs operated at 87 K.

Photon counting at 77 K with a single, 24 cm² SiPM Tile.

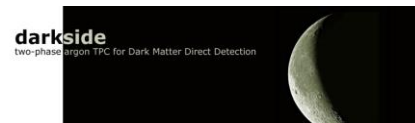
A 10x10 cm² SiPM array would have a total DCR < 100 cps!

Reduction of Dark Count Rate at cryogenic temperature thanks to electric field engineering in FBK SiPMs.



DarkSide-20k

Updated activity



FBK activity in 2024 is *mainly scientific support* for the *photodetector (SiPM) topics / issues that may arise during the construction* of the experiment, which is ongoing. The same is foreseen for 2025.

New ramp-up of activities is expected *once the construction and installation of the detector is completed*.

Discussions for *new activities* related to Cryogenic TPCs are ongoing, also *in the context of DRD2*.

Publications 2024

"Measurement of isotopic separation of argon with the prototype of the cryogenic distillation plant Aria for dark matter searches" –

<https://doi.org/10.48550/arXiv.2301.09639>

"Directionality of nuclear recoils in a liquid argon time projection chamber" – <https://doi.org/10.48550/arXiv.2307.15454>

Requests 2025

No requests at TIFPA in 2025.

Travels will be managed by the Sezione of the Italian PI.

Person	FTE 2025
Priyanka Kachru	50 (local coordinator)
Gola Alberto	20
Andrea Ficorella	20
Merzi Stefano	20
Laura Parellada Monreal	20
Giovanni Paternoster	20

「Thank you」

