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Silicon photomultipliers for DM searches with liquid argon detectors

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Next generation multi-ton scale noble liquid experiments have the unique opportunity to discover dark matter particles at the TeV scale, reaching the paramount sensitivity of 10^{-48} cm^2 in the WIMP nucleon scattering cross section. A prerequisite will be the reduction of radiogenic background sources to negligible levels, only possible if ultrapure high efficiency photosensors are available for the scintillation light readout.

Major requirements for the next generation experiments' photosensors are: high quantum efficiency, high gain, high single photon resolution, wide linear dynamic range, fast response, large sensitive areas, low radioactivity, low power consumption and low price.

An attractive solution is provided by SiPM arrays, with low intrinsic radioactive background and small mass in addition to unrivalled performances in single photon detection, enhanced in the cryogenic environment.

We will report on the R&D carried out at INFN Napoli and LNGS towards the realisation of a multi-ton scale liquid argon detector with SiPM light readout.

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