

Advancing Muon Veto Systems for the Future ANDES Underground Laboratory

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Muon veto detectors are crucial for deep underground experiments, designed to filter out cosmic muons that can mimic rare physics signals. Despite significant overburden, residual muons penetrate facilities like the future ANDES Laboratory, necessitating effective veto systems for low-background environments.

Our scientific groups are actively developing innovative muon detector designs and new sensor technology. We have designed and already constructed two muon telescopes for deployment in mines near ANDES, both in Argentina and Chile, to precisely measure muon flux and arrival directions. These measurements are vital for modeling and mitigating muon backgrounds, optimizing shielding, and validating simulation tools essential for experiment design and site selection.

A key advancement in our sensor, currently under development, is a novel digital Silicon Photomultiplier (dSiPM). This new device is specifically engineered to detect the faint light produced by scintillating fibers, which are commonly used in large muon detectors. It combines an array of Single-Photon Avalanche Diodes (SPADs) with on-chip CMOS circuitry for signal processing, enabling time-stamping and positional information at the individual SPAD level. These features will significantly enhance the capabilities of future muon veto systems.

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Collaboration you are representing

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