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RPC readout optimization: miniTRASGO as a path to a single-plane multiplexed timing system

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Wide multigap glass RPCs deployed in the miniTRASGO muon monitor, developed at LIP [1] provide a field reference for readout optimization. Continuous operation has been used to validate mechanics and HV distribution, grounding and shielding, environmental corrections, and a lightweight trajectory reconstruction chain. These lessons inform a timing-oriented architecture in which a single thin, multigap chamber [2], equipped with narrow strips and signal merging/multiplexing, dispenses with a separate thick-strip plane to reduce channel count and material [3]. Reference measurements with a double-stack system indicate operating regimes where single-plane efficiency can degrade even while timing remains competitive; planned high-voltage and power-delivery scans, together with complementary fast/slow shaping on the thin strips, are designed to isolate and mitigate these effects. The target performance is hundreds-of-picoseconds time resolution with sub-millimetre position from a simplified readout, scalable from compact telescopes to large-area Time-Of-Flight detectors. Emphasis is placed on detector engineering, readout topology and reconstruction workflow.

References

1. Soneira-Landín, C., Blanco, A., Fraile, L. M., Garzón, J. A., Kornakov, G., Lopes, L., Michel, J., Nouvilas, V. M., & Udías, J. M. (2025). miniTRASGO: design and initial results of a compact Resistive Plate Chamber telescope for worldwide cosmic ray monitoring. *Advances in Space Research*, 76(9), 5688–5699. <https://doi.org/10.1016/j.asr.2025.07.096>.
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Abstract

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1. Soneira-Landín, C., Blanco, A., Fraile, L. M., Garzón, J. A., Kornakov, G., Lopes, L., Michel, J., Nouvilas, V. M., & Udías, J. M. (2025). miniTRASGO: design and initial results of a compact Resistive Plate Chamber telescope for worldwide cosmic ray monitoring. *Advances in Space Research*, 76(9), 5688–5699. <https://doi.org/10.1016/j.asr.2025.07.096>.
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