Development of a portable SiPM scintillator tracker for cosmic rays

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A crucial aspect for outreach activities in cosmic-ray physics is the ability to bring the audience in contact with the experiments and let them visualize the underlying physics. A possible option is the use of portable detectors, which can be easily transported and operated in the various places where outreach activities take place (schools, theaters, etc.), and are equipped with a fast data acquisition system for real-time event visualization.

- We have developed a tracker for cosmic rays composed of scintillator bars with embedded wavelength shifting (WLS) fibers coupled to Silicon Photomultipliers (SiPMs).
- The SiPMs are read out with Caen DT5702 Front-End boards.
- The DAQ is controlled by a Raspberry Pi 4 single computer board, equipped with a GPS for relative timing and multiple board operation.
- The data acquisition is performed with a python wrapped custom modified version of the Caen DT5702 C++ library. This results in an easy-to-use DAQ handling class.
- A GUI with an online event display has been developed for the portable device.

This results in a simple, portable system allowing online track visualization and cosmic ray rate measurements.