



Deployment of a novel energetic particle microscintillator to measure cosmic rays and radioactivity in a range of environments

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An energetic particle microscintillator has recently been developed for measurement of the count rates and energies of radioactive particles in the atmosphere. Applications of this device include measuring atmospheric ionisation from cosmic rays and space weather, to natural environmental radioactivity or radiological hazard monitoring. The microscintillator's low mass, power and cost make it suitable for deployment on a range of platforms, for example, as a payload for a weather balloon, or as a hand-held battery-powered device using Bluetooth interfacing to a mobile phone. Here we report results from two balloon flights over the southern UK in August and December 2018 where the microscintillator was flown alongside Geiger counters for comparison. Unexpectedly, the package was retrieved after the August flight permitting laboratory tests and a repeat flight with the same payload. Longer-duration tests at altitude were also carried out with a standalone microscintillator in the Alps (5 km altitude) and on a commercial flight (10 km). The cosmic ray muon signal was identified in the energy spectrum data, as well as the gamma radiation for which the detector has previously been calibrated. This demonstrates effective discrimination between different types of high-energy particle.