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Balloon-borne and Space-based Experiments with Non-magnetic Detectors

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Direct measurements of cosmic rays with satellite or balloon-borne detectors are used for understanding cosmic ray origin, acceleration and propagation, exploring the supernova acceleration limit, and searching for exotic sources such as dark matter. Their energy reach is currently limited to $\sim 10^{15}$ eV by the detector size and exposure time, but incident particles are identified element-by-element with excellent charge resolution. A challenge of balloon-borne and space-based experiments is that the detectors must be large enough to collect adequate statistics, yet stay within the weight limit for available space flight. Innovative approaches now promise high quality measurements over an energy range that was not previously possible. Recent measurement results will be reviewed and their implications will be discussed. The outlook for existing and future experiments with non-magnetic detectors will also be discussed.

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