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# Detectors for high-energy messengers from the Universe

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## Abstract

High-energy messengers from the Universe comprise charged cosmic rays, gamma rays and neutrinos. Here we summarize the detection principles and detection schemes for these particles, with a focus on ground-based instruments which employing natural media such as air, ice, or water as their detection medium.

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High energy astrophysics is concerned with the study of non-thermal particle populations in our Galaxy and beyond, with their sources, propagation, and impact on their cosmic environment. This field relies on detectors for high-energy messengers from the Universe – the subject of this article – but also on astrophysical instruments in many other domains of the electromagnetic spectrum, most notably in the radio and X-ray, tracing the synchrotron radiation of high energy electrons. For the current discussion, we will – somewhat arbitrarily – concentrate on the domain from GeV energies up, where the detectors address common science themes and share many detection features; MeV instruments differ in terms of their science focus but also in their detection principles.

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