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100 years of Cosmic Rays - from the ionisation of air to beyond the LHC

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The study of cosmic rays has impacted on many disciplines, including astrophysics, particle physics, carbon dating and radio astronomy: it has thus had scientific and societal impact. They were discovered in 1912 as a result of the efforts by some of the most distinguished scientists of that era, puzzled by their inability to explain the discharge of ionisation chambers. I will describe some of the early work that led, *inter alia*, to the discovery of the positron, the muon and the first strange particles and thus to the birth of particle physics. In 1938 it was found that showers of particles that arrive at the earth simultaneously are produced by primary cosmic rays of $\sim 10^{15}$ eV, about 10^5 times more energetic than any particles that had been contemplated before. I will discuss how study of these showers has led to the discovery of cosmic rays of energies as great as 3 x 10^{20}eV, challenging our understanding of where and how they are created. Data from the Pierre Auger Observatory, the largest cosmic-ray detector ever built, is now being used for astrophysical studies and to give glimpses of some hadronic physics at centre-of-mass energies more than 4 times greater than are accessible at the LHC.