Local distributor of solar winds in ghana

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The Universe hosts extreme environments, from the coldest temperatures to the most energetic sources. Extreme objects such as supernova remnants, pulsars or active galactic nuclei produce charged particles and gamma radiation with energies far above those reached in thermal processes such as nuclear fusion in stars.

The measured energy spectrum of cosmic electrons and positrons. The red circles show the data measured by H.E.S.S.. The dark red band corresponds to the broken power law fit to the data, where the width of the band corresponds to the statistical errors of the measurements. The light blue band indicates the estimated range of the actual particle spectrum, taking into account contamination by other particles as well as statistical and systematic errors.

Artist"s impression of a rotating pulsar with its strong magnetic field twisting around it. Clouds of charged particles move along the field lines and their gamma rays are beamed like a lighthouse light by the magnetic fields.

Data analysis: The astrophysicists analyzed a huge data set collected over a decade by four of the H.E.S.S. telescopes. They used novel and rigorous selection algorithms to identify cosmic electrons with unprecedentedly low background contamination. This resulted in a statistically high-quality dataset for the analysis of cosmic electrons. In particular, the researchers were able to measure electrons and positrons with energies of up to 40 TeV.

The challenge is to distinguish the cascades produced by electrons or positrons from the more common cascades produced by the impact of heavier cosmic nuclei or gamma photons. In 2008, researchers succeeded for the first time in identifying electron and positron signals in the data from the H.E.S.S.-Cherenkov-Telescope.

Source identification: While gamma radiation can be traced directly back to the source, this is not possible for charged cosmic particles. These hit the Earth"s atmosphere from a wide range of directions, even if they all originate from the same source. This is due to the deflection by magnetic fields in the Milky Way.

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