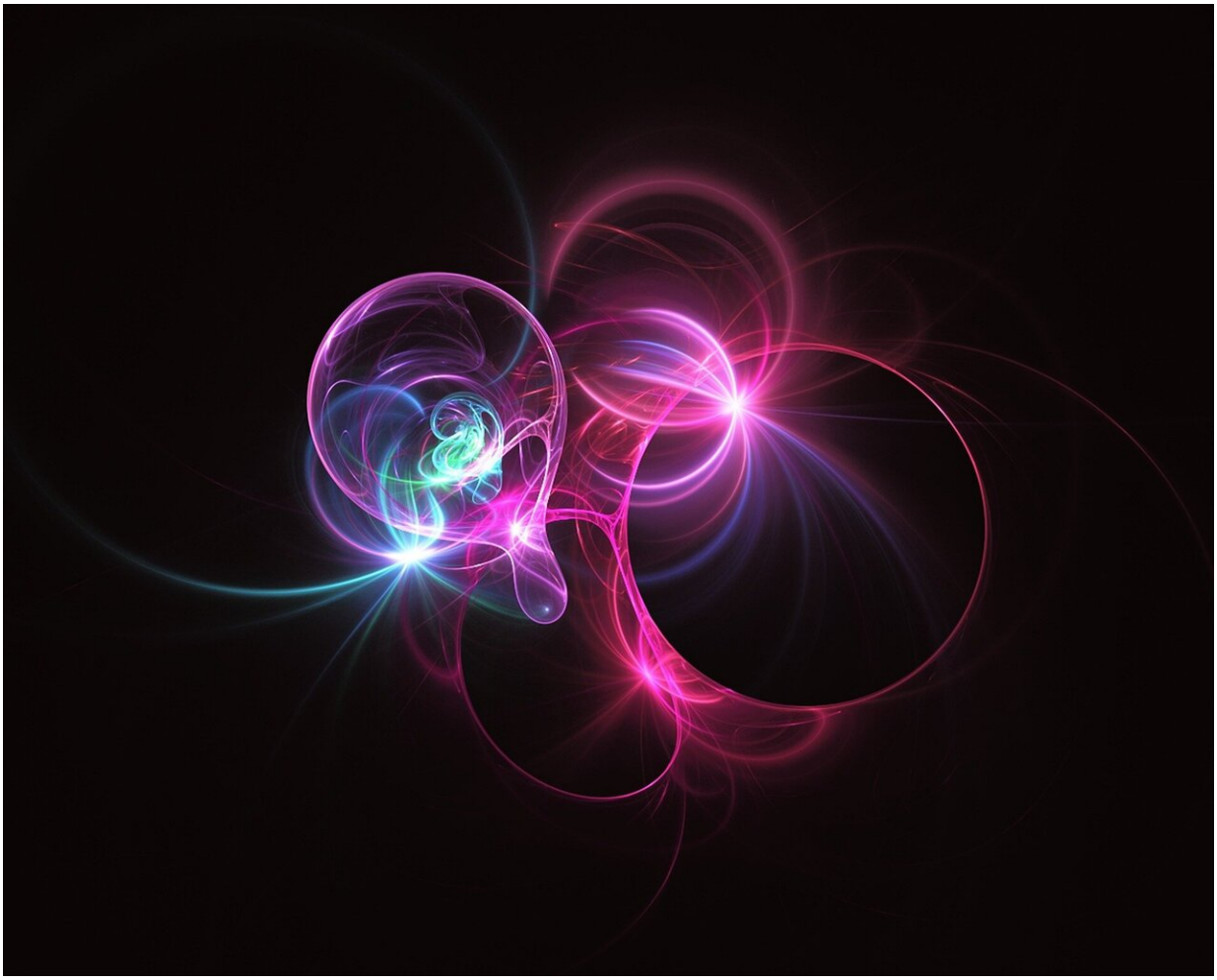
Data from Chinese satellite shedding light on cosmic rays

September 30 2019, by Bob Yirka



Credit: CC0 Public Domain

An international team of researchers studying data from China's Dark Matter Particle Explorer (DAMPE) has measured cosmic ray protons up to the energy of 100 TeV with high precision for the first time. In their paper published in the journal *Science Advances*, the group describes the research they have been conducting on data received from the satellite and what they have learned thus far.

Four years ago, the Chinese government launched into orbit the DAMPE satellite-based telescope (nicknamed Wukong after the Monkey King—a hero in a Chinese tale)—its stated mission is threefold: to study properties of dark matter by taking a closer look at high-energy gamma rays and electrons; to study possible origins of cosmic rays by carefully analyzing heavy nuclei and high energy electrons; and finally, to study the nature of propagation and acceleration of cosmic rays.

Scientists believe that most cosmic rays are produced by supernova explosions. And prior research has shown that most cosmic rays are actually pieces of atomic nuclei—and all of the elements of the periodic table have been found to be present in them. Approximately 90 percent of the cosmic rays that reach the Earth are actually nuclei of hydrogen atoms (protons). Scientists have also found that the paths cosmic rays take in reaching us are impacted by a variety of factors such as magnetic fields—thus, it is difficult, if not impossible, to determine their source. To learn more about possible sources, scientists look at cosmic ray spectra.

In this new effort, the researchers have been focusing on proton cosmic rays. In studying them with higher precision than earlier efforts, they have found instances of proton changes that rise by hundreds of billions of electron volts and then drop to levels as lows as 14 TeV. This is evidence of cosmic rays with unique spectral features, according to the researchers. They further suggest that the source of such spectral features could be local, though they acknowledge that it could just as

well originate from something else. They even suggest it is possible that there are multiple types of sources in the Milky Way generating different spectra.

More information: undefined undefined et al. Measurement of the cosmic ray proton spectrum from 40 GeV to 100 TeV with the DAMPE satellite, *Science Advances* (2019). DOI: 10.1126/sciadv.aax3793

© 2019 Science X Network

Citation: Data from Chinese satellite shedding light on cosmic rays (2019, September 30) retrieved 8 May 2024 from https://phys.org/news/2019-09-chinese-satellite-cosmic-rays.html

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.