Spectrum of CREs between 300 GeV and 5 TeV, as measured by VERITAS along with previously published measurements. For details, see Figure 2 below. Reference: A. Archer et al. (The VERITAS Collaboration), Phys. Rev. D 98: 062004, 2018

Full text version
ArXiv: ArXiV:1808.10028
Contacts: Ben Zitzer, Dave Staszak

Cosmic-ray electrons and positrons (CREs) at GeV-TeV energies are a unique probe of our local Galactic neighborhood. CREs lose energy rapidly via synchrotron radiation and inverse-Compton scattering processes while propagating within the Galaxy and these losses limit their propagation distance. For electrons with TeV energies, the limit is on the order of a kiloparsec. Within that distance there are only a few known astrophysical objects capable of accelerating electrons to such high energies. It is also possible that the CREs are the products of the annihilation or decay of heavy dark matter (DM) particles. VERITAS, an array of imaging
air Cherenkov telescopes in southern Arizona, USA, is primarily utilized for gamma-ray astronomy, but also simultaneously collects CREs during all observations. We describe our methods of identifying CREs in VERITAS data and present an energy spectrum, extending from 300 GeV to 5 TeV, obtained from approximately 300 hours of observations. A single power-law fit is ruled out in VERITAS data. We find that the spectrum of CREs is consistent with a broken power law, with a break energy at $710 \pm 40_{\text{stat}} \pm 140_{\text{syst}}$ GeV.

FITS files: N/A

Figures from paper (click to get full size image):

Figure 1: CRE BDT response parameter for the full data set (symbols) and for simulated proton-induced showers (histogram) in the energy range between 630 GeV and 1 TeV. The plot in the inset is the ratio of the two. Hadronic showers are assigned BDT values close to -1.0 while electromagnetic showers are assigned values near 1.0.
Figure 2: Spectrum of CREs between 300 GeV and 5 TeV, as measured by VERITAS along with previously published measurements. Error bars are statistical; systematic uncertainties are indicated by the gray band.