Contribution ID: **41** Contribution code: **EGAL** Type: **Oral**

Deep observations of the starburst galaxy M82 by the VERITAS gamma-ray observatory

Monday, September 2, 2024 4:30 PM (15 minutes)

Assuming galactic cosmic rays originate in supernovae and the winds of massive stars, starburst galaxies should produce VHE gamma-ray emission via the interaction of their copious quantities of cosmic rays with their large reservoirs of dense gas. Such VHE emission was detected by VERITAS from the starburst galaxy M82 in 2008-09. An extensive campaign followed these initial observations, yielding a total of 335 h of VERITAS data on M82 to date. Leveraging modern analysis techniques, these VERITAS data show a significantly stronger VHE signal (6.5 standard deviations). The corresponding photon spectrum is well fit by a power law, and the observed integral flux above 450 GeV is about 0.4\% of the Crab Nebula flux above the same energy threshold. The improved VERITAS measurements, when combined with various multi-wavelength data, enable modeling of the underlying emission and transport processes. A purely leptonic scenario for the gamma-ray spectral energy distribution (SED) is found to be unlikely. A hadronic scenario with cosmic rays following a power-law spectrum in momentum (index s=2.35) provides a good match to the observed SED. The synchrotron emission from the secondary electrons indicates that efficient non-radiative losses of cosmic-ray electrons may be related to advective escape from the starburst core.

Author: POHL, Martin (DESY / University of Potsdam)

Presenter: POHL, Martin (DESY / University of Potsdam)

Session Classification: Parallel 2