Qi Feng

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Education

2015 • Ph.D. Physics, Purdue University.

2009 • B.S. Physics, University of Science & Technology of China.

Experience

2017–present • Postdoctoral Research Scientist at Nevis Laboratories / Department of Physics, Columbia University (2017–2018) / Department of Physics, Barnard College (2018–present).
Supervisors: Prof. Reshmi Mukherjee, Prof. Brian Humensky

- Participating the commissioning of the prototype 9.7m Schwarzschild-Couder Telescope for the Cherenkov Telescope Array, and the calibration of its camera and optical systems.
- Co-leading the VERITAS blazars science working group (2018–present).
- Continuing the multiwavelength monitoring of TeV blazars, focusing on their variability (principle investigator of an XMM proposal, NASA grant allocated at $48 k).
- Co-developing a deep learning package, CTLearn, using convolutional and recurrent neural networks for event classification of gamma-ray data and simulations with Python.
- Continuing to lead the effort of the data quality monitoring of the VERITAS experiment.
- Serving on the VERITAS time allocation committee (2018–2019).
- Continuing the search for gamma-ray signals from primordial black hole evaporation events in the VERITAS archival data, setting an upper limit on the rate of such evaporation events.
- Searching for gamma-ray emission from hydrogen poor superluminous supernovae.
- Analyzing VERITAS data for three blazars to study the extragalactic background light.

2015–2017 • Postdoctoral Research Fellow at the Department of Physics, McGill University.
Supervisor: Prof. David Hanna

- Used different machine learning algorithms (e.g. gradient boosting, boosted decision trees, and convolutional networks) to classify signal/background events in astronomical data with Python.
- Principle investigator of a program that focuses on variable AGN time series with coordinated observations from multiple instruments, eligible for a NASA grant of $40 k.
- Led the effort of the data quality monitoring of the VERITAS experiment, working with Python and ROOT, a C++ based analysis/visualization package similar to R.
- Searched for gamma-ray signals from primordial black hole evaporation events in the VERITAS archival data, setting an upper limit on the rate of such evaporation events.
- Built a citizen science project "Muon Hunter" with a team to obtain reliably labelled data sets for the training of convolutional neural networks, and to advertise gamma-ray astrophysics.

2011–2015 • Graduate Research Assistant at the Department of Physics & Astronomy, Purdue University.
Advisor: Prof. Wei Cui

- Led the studies of multivariate astronomical time series of two TeV blazars, using e.g. power spectrum, cross correlation, and spectrogram.
- Improved the sensitivity of the realtime analysis by 15% for observations taken in special modes under moonlight through parameter optimization.
- Produced Monte Carlo simulations of cascades of particles in the atmosphere to improve the calibration of the VERITAS experiment.

2008–2009 • Undergraduate research at Center for Astrophysics, Univ. of Science & Technology of China. Advisor: Prof. Junxian Wang

- Measured the black hole mass of AGN using narrow Fe K_α line reverberation mapping.

Teaching

Teaching Assistant at Department of Physics & Astronomy, Purdue University:

2011 Spring • Intermediate Astronomy II (ASTR364).
2010 Fall • Intermediate Astronomy I (ASTR363).
2010 Spring • Descriptive Astronomy: Stars and Galaxies Lab (ASTR264).
2009 Fall • Intermediate Astronomy I (ASTR363) and Cosmology (ASTR370).

Academic service

- Reviewer for multiple NASA programs.
- Referee for *MNRAS*, *A&A*, *Galaxies*, *JHEAP*.

Publications

Selected journal articles

(Authors of VERITAS papers are listed alphabetically)

- *MWL observations of the blazar BL Lacertae: a new fast TeV gamma-ray flare*, Abeysekara, A. U., et al. 2018, ApJ 856, 95.
- *A search for spectral hysteresis and energy-dependent time lags from X-ray and TeV gamma-ray observations of Mrk 421*, Abeysekara, A. U., et al. 2017, ApJ, 834, 2
- *Rapid TeV Gamma-Ray Flaring of BL Lacertae*, Arlen, T., et al. 2013, ApJ, 762, 92
- *Long-term investigation of the multi-wavelength behaviour of the TeV blazar 1ES 1215+303: 2008 – 2017*, The *Fermi* and VERITAS Collaborations, 2019, to be submitted
- *Multiwavelength Observations of the Blazar VER J0521+211 during an elevated TeV gamma-ray state*, The VERITAS Collaboration and MWL partners, 2019, to be submitted .
- *A search for Primordial Black Hole Evaporation with the VERITAS experiment*, the VERITAS Collaboration, in prep.
- *VERITAS Observations of the Flat-Spectrum Radio Quasars 3C 279 and PKS 1222+216*, the VERITAS Collaboration, in prep.
- *Multi-wavelength Study of Quiescent States of Mrk 421 with Unprecedented Hard X-ray Coverage Provided by NuSTAR in 2013*, Baloković, et al. 2016, ApJ, 819, 156
- *Multiwavelength Observations of the Previously Unidentified Blazar RX J0648.7+1516*, Aliu, E., Aune, T., Beilicke, M., et al. 2011, ApJ, 742, 127
- *Multi-wavelength observations of Mrk 421 during the great flare of February 2010*, the VERITAS Collaboration and MWL partners, submitted
- *Measurement of the extragalactic background light spectral energy distribution with VERITAS*, the VERITAS Collaboration, to be submitted

• *Design and Performance of the Prototype Schwarzschild-Couder Telescope Camera*, the CTA pSCT project, in prep.
• *Multiwavelength Observations of the blazar 1ES 1959+650*, The VERITAS Collaboration and MWL partners, in prep.
• *Multiwavelength Observations of the Radio Galaxy NGC 1275 during a flare*, The VERITAS Collaboration and MWL partners, in prep.
• *VERITAS discovery of VHE gamma-ray emission from the blazar 1ES 0502+675*, the VERITAS Collaboration, in prep.
• 62 co-signed publications within the VERITAS Collaboration and the CTA consortium (*link to ADS library, ADS classic form*).

Conference Proceedings

• *Prototype Schwarzschild-Couder Telescope for the Cherenkov Telescope Array: Commissioning Status of the Optical System*, Feng, Q., et al., for the CTA SCT Project, 2019, ICRC, 36, 672 PoS(ICRC2019)672
• *Multiwavelength Observations of the Blazar BL Lacertae: a new fast TeV gamma-ray flare*, Feng, Q., for the VERITAS Collaboration, Jorstad, S. G., et al. 2017, arXiv:1708.06386
• *A citizen-science approach to muon events in imaging atmospheric Cherenkov telescope data: the Muon Hunter* Feng, Q., for the VERITAS Collaboration, & Jarvis, J. 2017, arXiv:1708.06393
• *The analysis of VERITAS muon images using convolutional neural networks*, Feng, Qi, & Lin, T. Y., for the VERITAS Collaboration, 2017, Astroinformatics, 325, 173

Conference presentations

• *CTLearn: Deep Learning for Gamma-ray Astronomy*
Feng, Q., Brill, A., Humensky, Kim, B., Mienerd, T., Mukherjee, R., Nieto, D., and Sevilla, J., Data Science and Machine Learning Workshop, The 17th Biennial International Conference on Accelerator and Large Experimental Physics Control Systems, Oct 6, 2019, New York, NY.
• *Prototype Schwarzschild-Couder Telescope for the Cherenkov Telescope Array: Commissioning Status of the Optical Alignment System*
Feng, Q., Brill, A., Humensky, T. B., Kaaret, P., Kieda, D., Kim, B., Mukherjee, R., Petrashyk, A., Ribeiro, D., Shang, R., Sternberger, R., Stevenson, B., Vassiliev, V. V., Wilcox, P. for the CTA pSCT project, 36th International Cosmic Ray Conference, Jul 24 - Aug 1, 2019, Madison, WI.
• *Gotta keep an eye on you – those flares we caught and wanted to catch with VERITAS*
Feng, Q., The fifth Fermi-VERITAS-HAWC Workshop, May 16-17, 2019, Houghton, MI.
• *Cosmic Accelerators Through the Eyes of Ground-Based Gamma-Ray Telescopes*
Feng, Q., LHAASO Scientific Observation and Multi-messenger Astronomy Workshop, Apr 24-28, 2019, Chengdu/Daocheng, China.
• *Very-High-Energy Emission from Extragalactic Cosmic Accelerators - Highlights from recent VERITAS AGN Observations*
Feng, Q., for the VERITAS Collaboration, Eighth International Fermi Symposium, Oct 14-19, 2018, Baltimore, MD.
• *A search for primordial black hole evaporation events with the VERITAS experiment*
Feng, Q., Zitzer, B, for the VERITAS Collaboration, The 30th Rencontres de Blois, June 03-08, 2018, Blois, France.
• *MWL Observations of the Blazar BL Lacertae: a new fast TeV gamma-ray flare*
Feng, Q., for the VERITAS Collaboration, Jorstad, S. G., et al., 35th International Cosmic Ray Conference, 12-20 July, 2017, Busan, Korea.
• *A citizen-science approach to muon events in VHE data: the Muon Hunter*
Feng, Q., for the VERITAS Collaboration, and Jarvis, J., 35th International Cosmic Ray Conference, 12-20 July, 2017, Busan, Korea.
• *The analysis of VERITAS muon images using convolutional neural networks*

Feng, Q., Lin, Tony T. Y., for the VERITAS Collaboration, IAU Symposium 325 on Astroinformatics, Oct 20-24, 2016, Sorrento, Italy.

- *Recent Highlights from VERITAS*
  Feng, Q., for the VERITAS Collaboration, 11th SciNeGHE workshop, Oct 18-21, 2016, Pisa, Italy.
- *Simultaneous X-ray and gamma-ray observations of Mrk 421 during a strong flaring episode*
  Feng, Q., & Cui, W., HEAD 2014, Aug 17-21, 2014, Chicago, USA.
- *Highlights from the VERITAS Blazar Observation Program*
  Feng, Q., Cui, W., & the VERITAS Collaboration, AAS 222, Jun 2-6, 2013, Indianapolis, USA.
- *Rapid TeV Gamma-ray Variability of BL Lacertae*
  Feng, Q., HEAD 2011, Sep 7-10, 2011, Newport, USA.

Other talks

- *Status and Recent Results of Very-High-Energy Gamma-ray Astrophysics with VERITAS and CTA*, Seminars talk, 2019 Aug 26, Kansas State University.
- *Extragalactic Cosmic Accelerators Through the Eyes of Ground-Based Gamma-Ray Telescopes*, Seminars talk, 2018 Dec 24, Institute of High Energy Physics, Chinese Academy of Sciences.
- *Extragalactic Cosmic Accelerators Through the Eyes of Ground-Based Gamma-Ray Telescopes*, Seminars talk, 2018 Dec 21, Kavli Institute for Astronomy and Astrophysics, Peking University.
- *Extragalactic Cosmic Accelerators Through the Eyes of Ground-Based Gamma-Ray Telescopes*, Seminars talk, 2018 Dec 19, Tsinghua Center for Astrophysics, Tsinghua University.
- *Variability of Very-High-Energy Emission from Extragalactic Cosmic Accelerators*, Talk at the 2018 AstroFest, 2018 Sep 7, Columbia University.
- *Introduction to Very-High-Energy Astrophysics*, Talk to incoming 2018 Barnard College undergraduate students in the Science Pathways Scholars Program, 2018 Jul 30, Barnard College.
- *Machine Learning and Crowdsourcing Made Easy for Physicists*, Public lecture at the Physics Matters Lecture Series, 2017 May 4, McGill University.