Asif Imran

Astrophysics – Statistics

Wisconsin IceCube Particle Astrophysics Center
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Research Interests: Application of *cutting-edge* imaging techniques and statistical tools to analyze large quantities of data to study high-energy photon emissions from distant galaxies.

Education

Iowa State University, Ames, IA
Ph.D, Astrophysics — June 2010

Grinnell College, Grinnell, IA
B.A., Physics *With Honors* — May 2003

Skills

Hardware: HAWC Observatory

- Designed and built real-time, VMEbus-based data acquisition system capable of handling an unprecedented 500 MBytes/second. The novel design forgoes traditional hardware trigger in favor of purely software-based triggers.

Software

- Currently developing a C++-based package with a tightly integrated SQLite-DB backend for the real-time monitoring of gamma-ray emission to be used by the HAWC collaboration.
- Developed C-based libraries for synchronized readout of an array of single board computers with a net throughput rate of 500 MBytes/sec.
- Developed Monte Carlo simulation package for the VERITAS collaboration. Developed software analysis tools for the HAWC collaboration to measure sensitivity of the detector.
- Languages: Python, C, C++, database query languages (SQLite and MySQL).
- Tools: ROOT, IPython, NumPy, SciPy, Matplotlib, Boost, Pandas, Pyfits, SQLAlchemy, LaTeX, SVN, Git, bash & regexp.

Research Experience

Wisconsin Icecube Particle Astrophysics Center - Madison, WI
Postdoctoral Research Associate — 2013 – present
Supervisor: Stephan Westerhoff
Develop Analysis Framework for Fast, Real-Time Monitoring of Gamma Ray Emission with HAWC Observatory.

Los Alamos National Laboratory - Los Alamos, NM
Postdoctoral Research Associate — 2010 – 2013
Supervisor: Brenda Dingus
Designed and Built VME-based Data Acquisition System for the HAWC Experiment.
Study of Extragalactic Gamma-Ray Sources with data from HAWC and the Fermi-Space Telescope.

Iowa State University -Ames, IA
Graduate Student Researcher — 2005 – 2010
Advisor: Frank Krennrich
Analyzed Variable Gamma-Ray Emission from Active Galactic Nuclei.
Assembled & Tested camera electronics for the VERITAS telescopes.

Grinnell College - Grinnell, IA
Undergraduate Mentored Advanced Project — 2002
Advisor: Charlie Duke
Simulation of Cherenkov Photons from Cosmic-Ray Cascade in the Earth's Atmosphere.

Grants

Co-Investigator, *A Search for Unique Signatures from Extragalactic Background Light (EBL) Absorption Effects in TeV Blazar Spectra*, Fermi Guest Investigator Cycle 2 Grant 2009-2010 (PI: F. Krennrich).

Awards and Honors

Iowa State University

Graduate teaching excellence award 2005
Teaching assistant of the year, Dept. of Physics and Astronomy 2004
Hardware scholarship, Dept. of Physics and Astronomy 2003 - 2005

Grinnell College

International Merit Scholarship 1999 – 2003

Teaching Experience

Undergraduate Student Mentor

Stephen Sturdevant (University of Wisconsin- Madison) 2013 – Present

Instructor

WIPAC High School Internship Program Fall 2013
Co-taught high school students about basic electronic circuits and building data acquisition system with arduino boards.

Graduate Student Mentor

Peter Karn (UC Irvine) 2011 – 2013

Teaching Assistant

Department of Physics and Astronomy 2003 – 2005
Iowa State University, Ames, Iowa
Performed TA duties and conducted help sessions for Astronomy 120/150 (introductory astronomy courses), Astronomy 346 (intermediate astrophysics course) and Physics 221/222 (intermediate physics courses).

Teaching Assistant/Tutor

Department of Physics 2001 – 2003
Grinnell College, Grinnell, Iowa
Teacher's support for introductory physics workshop. Helped students identify problem areas and provided timely feedbacks.

Mathematics Lab Tutor

Grinnell College, Grinnell, Iowa 2001 – 2003
Provided structured mentoring to students. Conducted one-on-one help sessions aimed at supplementing class lecturers.

Conference and Workshop

APS 4-Corners Section Meeting (2012), Socorro, NM. *(Invited)*
The 32^{nd} International Cosmic Ray Conference (2011), Beijing, China.
APS April Meeting (2011), Anaheim, CA.
INPAC Meeting (2011), Asilomar, CA. *(Invited)*
The 31^{st} International Cosmic Ray Conference (2009), Lodz, Poland.

Selected Peer Reviewed Publications

Sensitivity of the high altitude water Cherenkov detector to sources of multi-TeV gamma rays, Abeysekara, A. U., et al. for the HAWC Collaboration, Astroparticle Physics, **50** (2013), 26A

Constraints on Cosmic Rays, Magnetic Fields, and Dark Matter from Gamma-Ray Observations of the Coma Cluster of Galaxies with VERITAS and Fermi, Arlen, T., et al. for the VERITAS Collaboration, Astrophysical Journal, **757** (2012), 123.

On the Sensitivity of the HAWC Observatory, Abeysekara, A. U., for the HAWC Collaboration, Astroparticle Physics, **35** (2012), 641.

Dectection of Pulsed Gamma Rays Above 100 GeV from the Crab Pulsar, Aliu, E., for the VERITAS Collaboration, Science, **334** (2011), 69.

Discovery of Very High Energy γ-ray from the SNR G54.1+0.3, Acciari, V., et al. for the VERITAS Collaboration, Astrophysical Journal Letters, **719** (2010), 69.

VERITAS discovery of variability in the very high energy γ-ray emission of 1ES 1218+304, Acciari, V., et al. for the VERITAS Collaboration, Astrophysical Journal Letters, **709L** (2010), 163.

A connection between star formation activity and cosmic rays in the starburst galaxy M 82, Acciari, V., et al. for the VERITAS Collaboration, Nature, **462** (2009), 770.

VERITAS upper limit on the very high energy emission from the radio galaxy NGC 1275, Acciari, V., et al. for the VERITAS Collaboration, Astrophysical Journal Letters, **706L** (2009), 275.

Radio imaging of the very-high-energy γ-ray emission region in the central engine of a radio galaxy, Acciari, V., et al. for the VERITAS Collaboration, Science, **325** (2009), 444.

Observation of extended very high energy emission from the supernova remnant IC 443 with VERITAS, Acciari, V., et al. for the VERITAS Collaboration, Astrophysical Journal, **698L** (2009), 133.

Evidence for long-term gamma-ray and x-ray variability from the unidentified TeV source HESS J0632+057, Acciari, V., et al. for the VERITAS Collaboration, Astrophysical Journal Letters, **698L** (2009), 94.

VERITAS observations of the BL Lac object 1ES 1218+304, Acciari, V., et al. for the VERITAS Collaboration, Astrophysical Journal, **695** (2009), 1370.

VERITAS observations of a very high energy gamma-ray flare from the blazar 3C 66A, Acciari, V., et al. for the VERITAS Collaboration, Astrophysical Journal Letters, **693L** (2009), 104.

The June 2008 flare of Markarian 421 from optical to TeV energies, Acciari, V., et al. for the VERITAS Collaboration, Astrophysical Journal Letters, **691L** (2009), 13.

Discovery of very high energy gamma-ray radiation from the BL Lac 1ES 0806+524, Acciari, V., et al. for the VERITAS Collaboration, Astrophysical Journal, **690L** (2009), 126.

Constraints on energy spectra of blazars based on recent EBL limits from galaxy counts, Krennrich, F., Dwek, E., & Imran, A., Astrophysical Journal Letters, **689L** (2008), 93.

Observation of gamma-ray emission from the galaxy M87 above 250 GeV with VERITAS, Acciari, V., et al. for the VERITAS Collaboration, Astrophysical Journal, **679** (2008), 1427.