Asif Imran

Astrophysics – Statistics

Wisconsin IceCube Particle Astrophysics Center 222 W. Washington Ave #500, Madison, WI Phone: (608)-890-0957 (office)

aimran@icecube.wisc.edu

Research Interests: Gamma-ray astronomy, data-driven discovery, statistics, machine-learning, instrumentation.

Education

Iowa State University, Ames, IA

Ph.D, Astrophysics

June 2010

Grinnell College, Grinnell, IA

B.A., Physics With Honors

May 2003

Skills Hardware

- Designed and developed a fast, real-time data acquisition system with high throughput. The system is now being used to collect data for the HAWC experiment. Very knowledgeable about Time-to-Digital converter (TDC) chips, VME-bus, VME-controllers. Proficiency with NIM electronics.
- Firsthand experience testing and assembling the camera electronics for the VERITAS instrument.

Software

- Expert knowledge of Python along with IPython, NumPy, SciPy, and Matplotlib.
- Highly proficient in C, C++, ROOT-analysis framework with a special emphasis on scientific computing, analysis of very large datasets, data mining and visualization.
- Use a variety of languages & tools including bash, regexp, Boost, CMake, Pandas, Pyfits, SQLAlchemy, LATEX, SVN, Git, and database query languages (including SQLite and MySQL) on a daily basis.
- Developed software libraries (based on C) for synchronized readout of an array of single board computers with a net throughput rate of 500 MBytes/sec.
- Developed Monte Carlo simulation tools and energy estimation package for the VERITAS collaboration. Developed analysis tools for the HAWC collaboration to measure sensitivity.
- 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.

Research Experience

Wisconsin Icecube Particle Astrophysics Center - Madison, WI

Postdoctoral Research Associate

2013 – present

Supervisor: Stephan Westerhoff

Fast, Real-Time Monitoring of Gamma Ray Emission with HAWC Observatory.

Search for Extragalactic Neutrino Emitters with IceCube Observatory.

Los Alamos National Laboratory - Los Alamos, NM

Postdoctoral Research Associate

2010 - 2013

Supervisor: Brenda Dingus

Design and Develop VME-based Data Acquisition System for the HAWC Experiment.

Study of Extragalactic Gamma-Ray Sources with HAWC and Fermi LAT.

Iowa State University - Ames, IA

Graduate Student Researcher

2005 - 2010

Advisor: Frank Krennrich

Analysis of Variable VHE Gamma-Ray Emission from Active Galactic Nuclei.

Grinnell College - Grinnell, IA

Undergraduate Mentored Advanced Project

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

Teaching assistant of the year, Dept. of Physics and Astronomy

Hardware scholarship, Dept. of Physics and Astronomy

2004

2005

Grinnell College

International Merit Scholarship

1999 - 2003

2002

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)

and Workshop The 32nd 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, <u>Nature</u>, **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 VER-ITAS, Acciari, V., et al. for the VERITAS Collaboration, <u>Astrophysical Journal</u>, **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.