


Zigfried Hampel-Arias

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Personal

DOB: 15 June, 1987
Nationalities: USA, Mexico
Languages: English (native), Spanish (native), French (intermediate)

Education

UW-Madison
Ph.D., Physics, 2017.
M.S., Physics, 2012.
Fields: Particle Astrophysics, Parallel Scientific Computing

Rice University
B.S., Chemical Physics, 2009.

Dissertation

“Cosmic Ray Observations at the TeV Scale with the HAWC Observatory”
Analyses of the all-particle energy spectrum from 10 – 500 TeV, energy dependence of cosmic ray Moon shadow, and the spectrum of a regional excess in the cosmic ray anisotropy. Methods include iterative Bayesian unfolding, GPU-accelerated Markov Chain Monte Carlo for parameter estimation, machine learning algorithm testing for event classification, and GPU cosmic-ray simulations for detector calibration.

Current Research

UW-Madison, USA; ULB, Belgium
Dates: 06/2017 - Present
Propagation simulations to study heliospheric effects on cosmic ray arrival distribution anisotropies at large and small scales, all sky anisotropy signal surveys using HEALPix, development of affine-invariant GPU-accelerated MCMC package.

Awards and Fellowships

Belgian American Educational Foundation Research Fellowship
Awarded for 2017-2018

Wallonie-Bruxelles International Short Stay Fellowship
06/2017-09/2017

US Fulbright Alumni Ambassador
12/2012-Present

NSF Graduate Research Fellowship
05/2011-05/2014

US Fulbright Research Fellowship
08/2009-06/2010

Mellon Mays Undergraduate Fellowship
05/2008-05/2009

Skills

| | |
|--------------|--|
| Programming: | C, C++, Python, GitHub, SVN, OpenCL, HEALPix, CUDA, PyOpenGL, TensorFlow |
| Analysis: | Data Analysis, Unfolding Techniques, MCMC, GPGPU, Machine Learning |

Publications
As Major
Contributor

Observation of Anisotropy of TeV Cosmic Rays with Two Years of HAWC
Astrophys. J. **865**, 57 (2018). arXiv:1805.01847

PyUnfold: A Python Package for Iterative Unfolding
Journal of Open Source Software, **3**(26), 741 (2018). 10.21105/joss.00741

Constraining the \bar{p}/p Ratio in TeV Cosmic Rays with the Moon Shadow
Phys. Rev. D **97**, 102005 (2018). arXiv:1802.08913

All-Particle Cosmic Ray Spectrum Measured by the HAWC from 10–500 TeV
Phys. Rev. D **96**, 122001 (2017). (**Editor's Suggestion**) arXiv:1710.00890

Probing Cosmic-Ray Propagation with TeV γ -Rays from the Sun with HAWC
PoS: Proceedings of the 35th ICRC (Busan), 2017. arXiv:1708.03732

*All-Particle and Light-Component Cosmic Ray Energy Spectrum
Measured by the HAWC Experiment*
PoS: Proceedings of the 35th ICRC (Busan), 2017. arXiv:1801.05526

Gamma Hadron Separation using Pairwise Compactness Method with HAWC
PoS: Proceedings of the 34th ICRC (The Hague), 2015. arXiv:1508.04047

Towards a Measurement of the e^+e^- Flux Above 1 TeV with HAWC
PoS: Proceedings of the 34th ICRC (The Hague), 2015. arXiv:1508.03466

Selected
Presentations

Cosmic Ray Observations with HAWC & GPU Simulations at TeV-Scales
Invited Talk for UG Astroparticle Seminar, Geneva, Switzerland (7/2/2018)
Invited Talk for MPIK Physics Seminar, Heidelberg, Germany (28/11/2016)
Invited Talk for RUB Astrophysics Seminar, Bochum, Germany (23/11/2016)

Unfolding Techniques and GPU Simulations at the TeV Scale with HAWC
Poster at SuGAR Solvay Workshop, IIHE, ULB, Belgium (24/1/2018)

TeV Scale Cosmic Ray Observations with the HAWC Observatory
Poster at ICFA Instrumentation School, UCI, La Habana, Cuba (5/12/2017)

Cosmic Ray Propagation Simulations and Spectral Features in the TeV Anisotropy
Invited Talk for Cosmic Ray Anisotropy Workshop,
UDG, Guadalajara, Mexico (10/10/2017)

Las partículas mas energéticas del universo: rayos cósmicos
Invited Public Talk for Semana Mundial del Espacio,
UDG CUCEI, Guadalajara, Mexico (9/10/2017)

Observation of the Moon and Sun with HAWC
Talk at TeVPA 2017, OSU, Ohio, USA (7/8/2017)

Very High Energy Cosmic Ray Observations with HAWC
Invited Talk for ULB-IIHE Seminar, Brussels, Belgium (14/10/2016)

Unfolding the All-Particle Cosmic Ray Spectrum Measured with HAWC
Talk at the American Physical Society, Salt Lake City, USA (18/4/2016)

Towards a Measurement of the e^+e^- Flux Above 1 TeV with HAWC
Poster at 34th ICRC, The Hague, Netherlands (5/8/2015)

Composition and Energy Resolution with HAWC 300
Talk at the American Physical Society, Denver, USA (13/4/2013)

Previous Positions

UW-Madison, USA

Dates: 09/2014 - 09/2016

IT Administrator for PostleLab in Psychology & Neuroscience Dept.

Centro Atómico Bariloche, Argentina

Dates: 08/2009 - 06/2010

Fulbright Research Scholar at the Pierre Auger Observatory

Project: High Energy Muon Simulations & Water Quality Analysis

Physics Department, Rice University, USA & CERN, Switzerland

Dates: 05/2008 - 05/2009

Undergraduate Research Assistant

Project: CMS Endcap Muon System Commissioning Studies

Los Alamos National Laboratory, USA

Dates: 05/2004 - 07/2007

Undergraduate Research Assistant

Project: Aqueous Radiochemical Methods Development for Nuclide Separation

Teaching

Physics Department, UW-Madison

Guest Lecturer, Acoustics for Musicians, Fall 2016

WIPAC, Physics Department, UW-Madison

Student Mentor, January 2015 - December 2016

Mentoring of two undergraduate research assistants through various HAWC astrophysics projects related to machine learning classification techniques and map-making optimization.

Physics Department, Rice University

Discussion Section & Grading, Computational Physics, Spring 2009

Computational & Applied Mathematics, Rice University

Discussion Section & Grading, Partial Differential Eqs, Fall 2008

Professional Organizations

American Physical Society

08/2012-Present

Society for the Advancement of Chicanos and Native Americans in Science (SACNAS)

08/2012-08/2015

Outreach

08/2010-05/2017

Volunteer for Wisconsin IceCube Particle Astrophysics Center (WIPAC). Participating in various WIPAC outreach programs including ice drilling demonstrations at Wisconsin public schools and 'Explorando las Ciencias' bilingual program for the Spanish-speaking community.

12/2012-05/2017

Fulbright Alumni Ambassador (AA). Participating in Fulbright outreach at 2013 National SACNAS Conference, informational and recruiting sessions at UW-Madison, UT-San Antonio and St. Mary's University.