

Hugo Alberto Ayala Solares

PhD Physics

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State College, PA, USA

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SUMMARY OF QUALIFICATIONS

Ph.D. physicist that is always trying to learn and apply new knowledge. My current focus is in observational astrophysics. I apply statistical tools and probability to find interesting events in the data. I also use optimization methods to find models that describe the data with frequentist and bayesian statistics. I perform simulations to characterize analyses. I manage and maintain a real-time system that receives and analyze large datasets. I have experience working with large collaborations as well as leading smaller groups within them.

TECHNICAL SKILLS

Python

Numpy, Matplotlib, Scipy, Pandas,
TensorFlow, Astropy

C++

Bash

Git

MySQL

LaTeX

Data Structures and Algorithms

Optimization

Machine Learning

Clustering, Classification

Probability

Frequentist, Bayesian

Statistical Analysis

Parameter estimation, regression

Physics

BUSINESS AND SOCIAL SKILLS

Effective communicator

Presentation skills

Adaptable to different audiences

Led collaborative teams

Process oriented

Fast learner

Strategic thinking

WORK EXPERIENCE

PostDoctoral Researcher

Pennsylvania State University

May 2017 – Ongoing

State College, PA, United States

- Building and maintaining the Astrophysical Multimessenger Observatory Network (AMON).
 - Develop coincidence analyses between different datasets to find candidate astrophysical multimessenger sources.
 - Search for sources of gamma-ray and neutrino emission by using a multimessenger approach.
- Member of the High Altitude Water Cherenkov (HAWC) Observatory.
 - Study gamma-ray emission from large-scale structures with HAWC data. Calculating credible intervals on the amount of emission of these sources.
 - Extragalactic and Multimessenger/Multiwavelength coordinator in HAWC.
- Associate Member of the IceCube Neutrino Observatory.
- Presented work in more than 10 conferences and collaboration meetings in the past 3 years.

Ph.D. Researcher

Michigan Technological University

2011-2017

Houghton, MI, United States

- Created and maintained laser calibration system of the HAWC detector.
- Developed optimization algorithms to reconstruct astrophysical events.
- Developed a statistical analysis to search for weak signal in high-level background

Research Intern

Photonics and Mathematical-Optics Group, ITESM

📅 Spring 2011

📍 Monterrey, N.L. Mexico

- Studied equations for spiral profiles of light after passing through birefringent objects.

EDUCATION

Ph.D. in Physics focused on Astrophysics

Michigan Technological University

📅 September 2011 – April 2017

📍 Houghton, MI, United States

Thesis title: Search for High-Energy Gamma Rays in the Northern Fermi Bubble Region with the HAWC Observatory

B.Sc. in Engineering Physics

Instituto Tecnológico y de Estudios Superiores de Monterrey

📅 August 2006 – December 2010

📍 Monterrey, N.L., Mexico

LANGUAGES

Spanish

Native Language

English

Fluent

German

Intermediate

LATEST PUBLICATIONS

📄 Journal Articles

- Ayala Solares, H.A. et al. (2021). "Multimessenger Gamma-Ray and Neutrino Coincidence Alerts using HAWC and IceCube sub-threshold Data". In: *ApJ* 906, p. 63. DOI: <https://doi.org/10.3847/1538-4357/abcaa4>.
- Solares, Hugo A. Ayala et al. (2020). "The Astrophysical Multimessenger Observatory Network (AMON): Performance and science program". In: *Astroparticle Physics* 114, pp. 68–76. ISSN: 0927-6505. DOI: <https://doi.org/10.1016/j.astropartphys.2019.06.007>. URL: <http://www.sciencedirect.com/science/article/pii/S0927650519301227>.
- Ayala Solares, Hugo Alberto (2019). "AMON Multimessenger Alerts: Past and Future". In: *Galaxies* 7.1. ISSN: 2075-4434. DOI: [10.3390/galaxies7010019](https://doi.org/10.3390/galaxies7010019). URL: <https://www.mdpi.com/2075-4434/7/1/19>.
- Solares, H. A. Ayala et al. (2019). "A Search for Cosmic Neutrino and Gamma-Ray Emitting Transients in 7.3 yr of ANTARES and Fermi LAT Data". In: *The Astrophysical Journal* 886.2, p. 98. DOI: [10.3847/1538-4357/ab4a74](https://doi.org/10.3847/1538-4357/ab4a74). URL: <https://doi.org/10.3847/1538-4357/ab4a74>.

AWARDS

- Funding from Swift Guest Investigator Program NASA Cycle 15
- Funding from Swift Guest Investigator Program NASA Cycle 16