



Markus Antonio Amano

Physicist, PhD Candidate

- March 5, 1994
- Gallalee Hall Tuscaloosa, AL 35487
- +01 970 507 0865 (Text Only)
- www.markuspad.com
- magarbiso@crimson.ua.edu
- American (Citizen of the USA)
- [Publication Count: 3](#)
(Expected before Graduation: 8)
- inokawazu
- Research Interest: Holography, Hydrodynamics, Higher Dimensional Gravity, String Theory
- Birth Surname: Garbiso

Languages

- English (Native) ● ● ● ● ●
- Japanese (Adept) ● ● ● ● ●

Hard Skills

- Mathematica ● ● ● ● ●
- Python ● ● ● ● ●
- ROOT (CERN) ● ● ● ● ●

About Me

I am currently a PhD candidate at **The University of Alabama**. I currently work on modeling Quark Gluon Plasma-like fluids with broken symmetries under the guidance of **Dr. Matthias Kaminski**. We seek to understand such fluids with modern holographic techniques. Practically we work with classical gravity on the AdS “gravity” side to analyze the Quark Gluon Plasma-like fluid. Using novel spacetimes and classical theories of gravity to break symmetries, we can understand the properties of dual fluids. My current aspiration is to understand spin and its coupling to angular momentum in strongly coupled fluids - like the Quark Gluon Plasma.

Notable Publications ([iNSPIRE](#)) ([arXiv](#))

- December, 2020 **Hydrodynamics of simply spinning black holes & hydrodynamics for spinning quantum fluids**
Markus Garbiso, Matthias Kaminski
JHEP
- August, 2020 **Resonating AdS Soliton**
Markus Garbiso, Takaaki Ishii, Keiju Murata
JHEP
- October, 2019 **Dispersion relations in non-relativistic two-dimensional materials from quasinormal modes in Hořava Gravity**
Markus Garbiso, Matthias Kaminski
JHEP

Professional Experience

Research

- Jan. 2017 – Present **Graduate Research** The University of Alabama
Various Projects currently include: *Calculating QNMs(Quasi-Normal Modes) for Non-Relativistic Holography*(strongly coupled non-relativistic fluid), *Calculating fluid properties and QNMs of a rotating relativistic fluid* (akin to a Quark Gluon Plasma), *finding novel gravitational solutions in AdS_5* (Resonating Solitons), *calculating quantum critical points for holographic scrambling and many-body chaos*, and *high energy relativistic spin-hydrodynamics* (via a first order formalism). Mathematica is being used for programming. I have used *High-performance computing* (HPC) to undertake the calculation of QNMs. During my independent studies I have read up on and presented to the local High Energy Physics (HEP) group: anomalies in field theories (Chern classes), spin-bundles, and twisted geometries.
- May 2013 – Aug. 2016 **Undergraduate Research** The Colorado School of Mines
Various projects the included: *Classifying Nuclear Data, Tested Impact of Porosity on Coking Sensors*. Python and Mathematica where used for programming.
- Oct. 2014 – Aug. 2015 **Junior Year Program in English (JYPE)** Tohoku University
Helped to implement XFPS to analyze photon beams. Programming was done with ROOT (CERN).

Teaching/Tutoring

- Sep. 2017 – Present **Part Time Physics/Math Tutor** Applied Tutoring
- Aug. 2016 – Present **Graduate Teaching Assistant** University of Alabama
- Jul. 2020 – Jul. 2020 **Physics Instructor** University of Alabama
Introduction to Electromagnetism and Modern Physics
- Aug. 2015 – May 2016 **Center for Academic Services and Advising (CASA) Tutor** The Colorado School of Mines
- Jan. 2013 – May 2013 **Center for Academic Services and Advising (CASA) Tutor** The Colorado School of Mines
- Jan. 2013 – May 2013 **Multicultural Engineering Program Tutor** The Colorado School of Mines

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Memberships



President - PAGSA (Physics Astronomy Graduate Student Association)

Stats as of June 6, 2021

Key: Published (for citable)

h-index	2 (2)
Citations	10 (10)
Publications	3 research articles
Citations per published paper	3.3 (3.3)
Talks Given	> 8

Past Memberships



Secretary - JACEC (Japanese American Cultural Exchange Club)

Education

Postgraduate Training

2020 – 2021	Physics PhD Candidate May 2021 is the expected graduation date	GPA: 3.939 - The University of Alabama
2016 – 2019	Physics PhD Student	GPA: 3.939 - The University of Alabama

Undergraduate Study

2012 – 2016	B.S. Engineering Physics	GPA: 3.586 - The Colorado School of Mines
2014 – 2015	Junior Year Program in English (JYPE)	Tohoku University

Current Projects

Jun. 2020 – Present	Holography with Spin We seek to introduce spin degrees of freedom into hydrodynamics. Using Lovelock Chern-Simons gravity we hope to expand on the work by Gallegos and Gürsoy - <i>Holographic spin liquids and Lovelock Chern-Simons gravity</i> .
Jun. 2020 – Present	Chaos and Hydrodynamics We hope to find chaos related quantities - Lyapunov exponent and butterfly velocity - for novel holographic gravity backgrounds. Keywords: Pole-Skipping Points, Convergence of hydrodynamic, Chaos Points

Science Communication

Notable Talks

Feb. 2020	Research Seminar	Tokyo University
	Globally Rotating Holographic Fluid Hydrodynamics	
Feb. 2020	Research Seminar	Ochanomizu University
	Globally Rotating Holographic Fluid Hydrodynamics	
Feb. 2020	Research Seminar	Chuo University
	Globally Rotating Holographic Fluid Hydrodynamics	
July 2019	Research Seminar	Würzburg University
	Non-Relativistic Hydrodynamics	
July 2017	Conference Talk	3rd Karl Schwarzschild Meeting at FIAS, Frankfurt
	Non-Relativistic Hydrodynamics	
July 2019	Research Seminar	Frankfurt Institute for Advanced Studies
	Non-Relativistic Hydrodynamics	

International Collaborations

Nov. 2019 – Present	Spin-Orbital Coupling	Frankfurt Institute for Advanced Studies (FIAS)
	We are working with Enrico Speranza (Frankfurt University, Germany) generalizing the hydrodynamic description to include spin degrees of freedom and rotation.	
Feb. 2020 – Jul. 2020	Resonating AdS Soliton	Nihon University & Kyoto University
	Worked with Professors Keiju Murata (Nihon University, Japan) and Takaaki Ishi (Kyoto University, Japan), we investigated an “AdS Soliton Resonator”.	

Honors & Awards

March, 2020	Outstanding Research by a Master's Student	The University of Alabama
2016 –	GTA Fellowship	The University of Alabama
2014 – 2015	JASSO Scholarship	Tohoku University
2009 – 2012	Deans List	The Colorado School of Mines
2008	Private Donation (USD 1,000)	Anonymous Private Donor