ROBIAH OKTIAVI

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Affiliations : 1) Department of Physics, University of Indonesia (UI)
2) Research Center for Quantum Physics, National Research and Innovation Agency (BRIN)

I graduated with a Bachelor's degree in Astronomy and am currently a Master's student in Physics. I have an interest in high energy physics experiments, especially particle detection and electronics detector design. My current research is simulating the feasibility of using cosmic muon as an imaging technique. Apart from my research activity, I also have an interest in public outreach, as I previously worked as an Astronomy communicator. I am highly self-motivated, possess solid problem solving skills, and am eager to contribute to scientific advancements while continuing to engage with the public on science.

EDUCATION

2024 – present (*expected graduate*: August 2026)	M.Sc. in Physics – University of Indonesia Thesis topic: *Cosmic-Muon Tomography Simulation to Evaluate Scaling in Geothermal Pipelines* Supervisor: 1) Dr.rer.nat Agus Salam, S.Si., M.Si. 2) Dr. M. Jauhar Kholili
2019 – 2023	B.Sc. in Astronomy – Bandung Institute of Technology Final project: *The Dependence of Baryonic Tully Fisher Relation (BTFR) on Galaxy Rotation Velocity at Different Characteristic Radii* Supervisor: Dr.rer.nat. Hesti Retno Tri Wulandari, S.Si., M.Si.

RESEARCH & ACADEMIC EXPERIENCES

Chemistry and Biology Private Tutor (March 2025 – present)
I teach Chemistry and Biology to students at junior and senior high school, making me develop my teaching skills and adapt explanations to different age groups. This is challenging as I study Physics instead of the two subjects I am teaching in, but it broadens my perspective on interdisciplinary science. I can draw connections between physics, chemistry, and biology to provide a more holistic understanding of certain scientific phenomena.

Research's Assistant (August 2024 – present)
Currently, I am working on a muon tomography simulation to evaluate scaling inside geothermal pipes. This project, which is both part of my master's thesis and my role as a research assistant at National Research and Innovation Agency (BRIN), serves as the initial step before implementing a real tomography system in Indonesia. As this is a pioneering study, I am closely working with my supervisor in developing and refining the GEANT4 simulation framework.

SOKENDAI KEK Tsukuba/J-PARC Summer Student Program (July – August 2025)
I participated in the Summer Student Program held by SOKENDAI and worked in the Electronics System (E-Sys) group of Institute of Particle and Nuclear Studies (IPNS), High Energy Accelerator

Research Organization (KEK) in Japan for two months. In this program, I learned about how to inference machine learning into the FPGA using my own data as a real case problem. There are a lot of tools I learned before I could implement my machine learning model into the FPGA. I started to build my model using the Keras package from Tensorflow, then converted it into an HLS project using hls4ml, followed by converting it into register transfer level using Vitis HLS, and finally tested the IP core on the FPGA hardware. I learned how the electronics system works mainly for the particle detection purpose in the detector, how to write Verilog codes, and how to read a digital signal from the simulation as well as hardware test.

Hilal Observation (March & April 2024)
I worked on a three-day crescent Moon observation at Bosscha Observatory using a portable telescope to determine the beginning of Ramadan and Syawal. The preparation phase included telescope setup and calibration, which involved polar alignment and pointing alignment over two days and nights. On the predicted day of the crescent's visibility, observations were carried out to confirm the calculated position of the hilal. This observation played a crucial role in verifying astronomical calculations and ensuring the accurate determination of the new month in the Hijri calendar.

Astronomy Communicator (July 2023 – June 2024)
I regularly facilitated public tours every Saturday, evening observation sessions twice a week, and school visits twice a week at Bosscha Observatory. I explained the observatory's history, its astronomical significance, and guided visitors in observing the Sun or night objects through the telescopes. Additionally, I introduced astrophotography exhibitions and answered diverse Astronomy-related questions. Beyond on-site visits, I also participated in outreach programs by visiting schools upon request, bringing Astronomy education directly to students. I was also involved in teaching and developing a hands-on module designed to introduce Astronomy concepts to students from pre-school to college levels**.**

Final Project Research (Aug 2022 – July 2023)
My bachelor's research explored the scaling relations of spiral galaxies called the *Baryonic Tully Fisher Relation* (BTFR) using observational data from the SPARC catalog and simulation data from the EAGLE simulation. The analysis was performed using the *Markov Chain Monte Carlo* (MCMC) algorithm, implemented in Python and executed on *High-Performance Computing* (HPC) facilities provided by BRIN. The objectives were to determine the rotation velocity that results in the tightest BTFR for both datasets and to investigate the potential evolution of the BTFR with redshift in the simulation data. This study is significant as it enhances our understanding of galaxy formation and evolution, bridging the gap between observational data and theoretical models in modern cosmology.

Team Project Leader & Assistant Lecturer (Jan 2022 - Dec 2022)
During the *Astronomical Institution Management* course, I led a team project investigating the astro-tourism potential of Hotel Alam Permai in Lembang, Bandung Barat regency. I developed an organizational structure consisting of 10 members, delegated responsibilities, and ensured efficient teamwork and project execution through regular monitoring. Following the course, I was appointed as an assistant lecturer in the next semester, where I managed attendance records and evaluated exam responses for approximately 90 participants while assisting in course coordination.

AWARDS

Finalist of Indonesian Research and Innovation Fair (IRIFair) | BRIN, 2023

Participants of ALMI Thesis Award | Akademi Ilmuwan Muda Indonesia, 2023

ARTICLE SELF-PUBLICATIONS

Personal project of writing astronomy popular articles: https://linktr.ee/robiahoktiavi

REFEREES

Dr. M. Jauhar Kholili. Junior researcher at Research Center for Physics, National Research and Innovation Agency (BRIN), Indonesia. Email: m.jauhar.kholili@brin.go.id

Dr.rer.nat. Agus Salam, S.Si., M.Si.. Senior Lecturer, Department of Physics, Universitas Indonesia, Email: agus.salam@sci.ui.ac.id

Dr. Yun-Tsung Lai. Assistant Professor at Electronics System (E-sys) Group of Institute of Particle and Nuclear Studies (IPNS), High Energy Accelerator Research Organization (KEK), Email: ytlai@post.kek.jp

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Dr.rer.nat. Hesti Retno Tri Wulandari, S.Si., M.Si. Head of Bosscha Observatory, Indonesia. Email: h.wulandari@itb.ac.id