AHMAD RIPAI

P.hD. Student in Theoretical Physics & Complex Systems
Research Center for Climate and Atmosphere, National Research and Innovation Agency (BRIN), Bandung 40135,
Department of Physics, IPB University, Jl. Meranti, Kampus IPB Darmaga, Bogor 16680, Indonesia

RESEARCH INTEREST

I am deeply interested in the theoretical physics of complex systems, with a specific focus on solitons and other nonlinear wave phenomena in nature. My current research involves studying nonlinear wave dynamics and atmospheric circulation in coastal and peatland areas of Sumatra. Previously, I worked on nonlinear optical waves, including solitons, Airy beams, breathers, and rogue waves, as well as on Bose-Einstein condensates.

Keywords: nonlinear wave, solitons, theoretical physics.

PERSONAL

Year of Birth	: 1996
Place of Birth	: Muara Botung, North Sumatra Province, Indonesia.
Nationality	: Indonesia.
Pronoun	: He/Him/His.
Language	: Indonesian (Native), English (Intermediate).

EDUCATION

Doctor in Physics *Now-2026*
on going, GPA: -/-

- Student Number (NIM)—G7601231004
- Research topics—Atmospheric Soliton and Land Sea Breeze Circulation in Coast of Sumatra
- Institution : Department of Physics, IPB University.
- Supervisor : Prof. Dr. Husin Alatas, S.Si, M.Si
- Co-Supervisor : Dr. Albertus Sulaiman S.Si., M.Si
- Support : BRIN - Degree by Research (Full).

Master of Science (M. Sc.) in Physics *August 2019 - May 2020*
Cumlaude, GPA: 3.89/4.00.

- Thesis— Application of the Split-Step Fourier Method in Investigating the Bright Soliton Solution in Photorefractive Crystals
- Institution : Department of Physics, Universitas Andalas.
- Supervisor : Dr. Zulfi Abdullah.
- Co-Supervisor : Dr. Mahdhivan Syafwan (Mathematics) and Dr. Wahyu Hidayat (Phyics, ITB).
- Support : Universitas Andalas - Fast Track Program (Full).

Bachelor of Science (B. Sc.) in Physics *August 2015 - May 2019*
Cumlaude, GPA: 3.67/4.00.

- Thesis—The Analysis of Burger Equation Solution as Soliton Solutions Using Hopf-Cole Transformation
- Institution : Department of Physics, Universitas Andalas.
- Supervisor : Dr. Zulfi Abdullah.
- Co-Supervisor : Dr. Mahdhivan Syafwan (Mathematics).
- Support : Government of Indonesia - Bidikmisi (Full).

CAREER

Research Fellow *June 2020 - December 2022*

Fundamental and collaborative research grants, FMIPA, LPPM, Universitas Andalas

Institution	: Department of Physics, Universitas Andalas.
Supervisor	: Dr. Zulfi Abdullah.
Grant	: IDR 120,000,000 for 2 years 6 months.
Project	: Mathematical Modelling and Theoretical aspect of Photorefractive Soliton.
Collaborator	: Dr. Aavishkar Katti (Physics, MIT-WPU, India).

Research Asisstant *June 2021 - December 2021*

Junior lecturer research grants, FMIPA, Universitas Andalas

Institution	: Department of Physics, Universitas Andalas.
Supervisor	: Trengginas Eka Putra Sutantyo, M.Si.
Grant	: IDR 15,000,000 for 6 months.
Project	: Nonlinear dynamics of DNA.

PERSONAL SERVICE

Referee of Optical and Quantum Electronics (*springer nature).*

BOOKS

Soliton dalam Medium Fotorefraktif: Pengantar, Teori, dan Komputasinya
Solitons in Photorefractive Media: Introduction, Theory, and Computation
Language: Indonesian (Bahasa)
Status: Under Publication
Preprint: Available on ResearchGate (Ahmad Ripai)

PUBLICATION AND PREPRINT

Journals (Peer-Reviewed) and Proceeding Articles

10. Ahmad Ripai, Zulfi Abdullah, Hanifah Azzaura Musyayyadah, and Aavishkar Katti (2024), *Solitons, breathers, and rogue waves on photorefractive backgrounds: exact solutions and steering propagation*, Preparation for submission.

9. Ahmad Ripai, Zulfi Abdullah, and Hanifah Azzaura Musyayyadah (2024), *Solitonic characteristics of optical Airy beams nonlinear propagation in biased centrosymmetric photorefractive medium*, Optics Communications, 570, page 130932, doi.org/10.1016/j.optcom.2024.130932.

8. Ahmad Ripai, Albertus Sulaiman, Husin Alatas, Mariko Ogawa, Osamu Kozan, Noersomadi, Raden Dwi Susanto, Manabu D Yamanaka (2024), *On the Atmospheric Solitary Waves Propagation Over Bengkalis Island*, Book Chapter, International Conference on Radioscience, Equatorial Atmospheric Science and Environment, page 475-484, doi.org/10.1007/978-981-97-0740-9_42.

7. Zulfi Abdullah, Ahmad Ripai, Hanifah Azzaura Musyayyadah, Trengginas Eka Putra Sutantyo, Mahdhivan Syafwan, Wahyu Hidayat, Mohamad Nazri Abdul Halif, and Aavishkar Katti (2024), *Temporal behavior of diffusion-trapped Airy beams in photorefractive media*, Optics Communications, 550, page 129930, doi.org/10.1016/j.optcom.2023.129930.

6. Zulfi Abdullah, Ahmad Ripai, Mahdhivan Syafwan, and Wahyu Hidayat (2023), *Traveling wave solutions for explicit-time nonlinear photorefractive dynamics equation*, Nonlinear Dynamics, Page 1-12, doi.org/10.1007/s11071-023-08610-8.

5. Zulfi Abdullah, Ahmad Ripai, Hanifah Azzaura Musyayyadah, Trengginas Eka Putra Sutantyo, Mahdhivan Syafwan, Wahyu Hidayat, Aavishkar Katti, and Mohamad Nazri Abdul Halif (2023), *Temporal behavior of bright and dark spatial solitons in photorefractive crystals having both the*

linear and quadratic electro-optic effects based on low amplitude approximations, Optik, 284, page 170871, doi.org/10.1016/j.ijleo.2023.170871.

4. T. E. P Sutantyo, A. Ripai, Z. Abdullah, W. Hidayat, And Freddy P. Zen (2022), *Soliton-like Solution on the Dynamics of Modified Peyrard-Bishop DNA Model in the Thermostat as a Bio-Fluid*, Emerging Science Journal. Vol. 6, No. 4, page 667-678, doi.org/10.28991/ESJ-2022-06-04-01.

3. Ahmad Ripai, Zulfi Abdullah, Mahdhivan Syafwan, and Wahyu Hidayat (2021), *Application of the Split-Step Fourier Method in Investigating a Bright Soliton Solution in a Photorefractive Crystal*, AIP Conference Proceeding, 2331 030023, doi.org/10.1063/5.0041878.

2. Trengginas E P Sutantyo, A Ripai, Z Abdullah, and W Hidayat (2021), *Nonlinear Dynamics of Modified Peyrard-Bishop DNA Model in Nosé-Hoover Thermostat*, Journal of Physics: Conference Series, 1876 012021, doi.org/10.1088/1742-6596/1876/1/0120.

1. A Ripai, Trengginas E P Sutantyo, Z Abdullah, M Syafwan, and W Hidayat (2021), *Effect of Ansatz on Soliton Propagation Pattern in Photorefractive Crystals*, Journal of Physics: Conference Series, 1876 012009, doi.org/10.1088/1742-6596/1876/1/012009.

Accredited National Journals

4. Zulfi Abdullah, Trengginas Eka Putra Sutantyo, Mahdhivan Syafwan, Ahmad Ripai, Hanifah Azzaura Musyayyadah, and Mohamad Nazri Abdul Halif (2023), *An Exact Solution of Nonlinear Schrödinger Equation in a Lossy Fiber System Using Direct Solution Method*, Jurnal Ilmu Fisika, Vol. 15, No.1, page 13-21, doi.org/10.25077/jif.15.1.13-21.2023. (English)

3. Nando Saputra, Ahmad Ripai, and Zulfi Abdullah (2022), *The Bilinear Formula in Soliton Theory of Optical Fibers*, Jurnal Fisika Unand, Vol. 11, No. 3, page 387-392, doi.org/10.25077/jfu.11.3.387-392.2022. (English)

2. Ahmad Ripai, Zulfi Abdullah, Mahdhivan Syafwan, and Wahyu Hidayat (2020), *Benchmarking of the Split-Step Fourier Method on Solving a Soliton Propagation Equation in a Nonlinear Optical Medium*, Jurnal Ilmu Fisika, Vol. 12, No. 2, page 105-112, doi.org/10.25077/jif.12.2.105-112.2020. (English)

1. Ahmad Ripai, Zulfi Abdullah, and Mahdhivan Syafwan (2019), *The Analysis of Burger Equation Solution as Soliton Solutions Using Hopf-Cole Transformation*, Vol. 8, No. 2, page 171-177, doi.org/10.25077/jfu.8.2.171-177.2019. (Bahasa)

CONTRIBUTED TALK

Oral Presentation

- *Optical Spatial Soliton in Photorefractive Crystals*, National Conference Cluster and Downstream Advance Research (KN-KHRB) VII 2021, Universitas Andalas, December 13-19th, 2021.
- *The Property Of Photorefractive Soliton Based On Separate Review Of Linear And Quadratic Electro-Optic Effects*, National Conference Cluster and Downstream Advance Research (KN-KHRB) VII 2021, Universitas Andalas, December 13-19th, 2021.
- *Application of the Split-Step Fourier Method in Investigating a Bright Soliton Solution in a Photorefractive Crystal*, National Conference Cluster and Downstream Advance Research (KN-KHRB) VI 2020 Universitas Andalas, December 1st-4th, 2020.
- *Effect of Ansatz on Soliton Propagation Pattern in Photorefractive Crystals*, The 3rd International Conference on Research and Learning Physics (ICRLP), State University of Padang, September 3rd-4th, 2020.

· *Application of the Split-Step Fourier Method in Investigating a Bright Soliton Solution in a Photorefractive Crystal*, The 2nd Science and Mathematics International Conference (SMIC), State University of Jakarta, August 8-9th, 2020.

· *Benchmarking of the Split-Step Fourier Method in Solving a Soliton Propagation Equation in a Nonlinear Optical Medium*, Seminar of National Physics, State University of Jakarta, June 20th, 2020.

AWARDS

Exam maker for National Physics Olympiad, Physics Festival, Universitas Andalas	*2021*
The best graduan of Department of Physics, Universitas Andalas	*2019*
Finalist of Physics Competition, MIPA Expo, Universitas Riau	*2019*
Semifinalist of Physics Competition, MIPA Expo, Universitas Riau	*2019*
Judge of National Physics Olympiad, Physics Festival, Universitas Andalas	*2018*
Contingent of National Physics Olympiad, ON-MIPA PT, X Region Kopertis, Pekanbaru	*2018*
Contingent of National Physics Olympiad, ON-MIPA PT, X Region Kopertis, Pekanbaru	*2017*
Runner up Physics Olympiad, POIF, Universitas Bengkulu	*2017*

∗ ∗ ∗ *National level awards*

TEACHING EXPERIENCE

- Tutor, National Physics Olympiad, Senior High School, West Sumatra Province, Indonesia, (2023).
- Teaching Assistant, Mathematical Physics 1 & 2, Soliton Theory, Electrodynamics, Modern Optics, Classical Mechanics, and Quantum Mechanics, Universitas Andalas, Indonesia (2017-2022).
- Laboratory Assistant, Computational Physics Laboratory, Univeritas Andalas, Indonesia (Second Half of 2017 and First Half of 2018).
- Tutor, National Olympiad in physics, college, Universitas Andalas, Indonesia, (2018-2019).

SKILLS

Analytics	Mathematical modelling and analytics, Mathematical physics
Computations	Computational physics and mathematics, numerical method
Programming Languages	Python, MATLAB, Wolfram Mathematica
Python Packages	Pandas, Matplotlib, Numpy, Scipy, Jupyter
Software	LaTeX, Microsoft Office or 365, Mathematica, COMSOL

REFERENCE

Prof. Husin Alatas	Department of Physics, IPB University alatas@apps.ipb.ac.id
Dr. Albertus Sulaiman	Research Center for Climate and Atmosphere, BRIN albe002@brin.go.id