Vikash Kotteeswaran - CV

https://vikash-kotteeswaran.github.io vikkykotty@gmail.com +91-7904099475

EDUCATION

Madras Christian College **Chennai, India**
BSc in Physics GPA: 9.05/10.0 *Expected Graduation: May 2022*

AMM Matric Higher Sec School **Chennai, India**
High School GPA: 9.04/10.0 *June 2017 - April 2019*

RESEARCH INTERESTS

- Gravitational waves from compact objects, compact object systems and cosmic explosions
- Orbital dynamics of compact objects in system
- Early Universe and Cosmology

ACADEMIC EXPERIENCE

Science Academies' Summer Research Fellowship Programme **Remote**
Summer Research Fellow *May 2021 - Aug 2021*

- **Guide:** Dr. Shashi Bhushan Pandey, Scientist-F, Aryabhatta Research Institute of Observational Sciences
- Worked with the SWIFT X-ray and UVOT observation data (Magellen, Gemini telescopes and Karl G. Jansky VLA) to estimate the External Forward Shock wave parameters of GRB 130603B

Physics Training and Talent Search Summer Program **Remote**
Summer School Student *July 2021*

- A lecture series on Quantum Mechanics at bachelors level was conducted with problems and tutorials
- Experimental sessions were held and students were assigned small projects in teams to present the applications at the end.

Introductory Summer School in Astronomy and Astrophysics, IUCAA **Remote**
Summer School Student *May 2021 – Jun 2021*

- Lecture series covering topics from Radiative processes to Gravitaional Waves and Compact binaries
- It involved lectures and demonstrations from a number of fellow scientists and proffesors from the Inter-University Centre for Astronomy and Astrophysics, Pune

Research Science Initiative - Chennai, IIT Madras **Chennai, India**
Student Intern *Apr 2018 – Jun 2018*

- **Guide:** Prof. P.K. Tripathy, Department of Physics, Indian Institute of Technology - Madras
- Several lectures were given in various fields of science that showed the existence of different paths
- Worked in a team under a mentor and learned about Lorentz transformation and Lorentz group and some of its applications

PERSONAL PROJECTS

- **TOV Equation solver** - Numerically solves Tolman Oppenheimer Volkoff equation for the Relativistic case using 4th order runge kutta method
- **ODE solver** - A package to solve Ordinary differential equations numerically. It includes adaptive step sizing so that it can run optimally by changing its step size accordingly.
- **Electromagnetic Engine (analysis)** - Investigated an engine that works from a magnetic head and an electromagnetic piston
- **Handwritten Number Generator** - Trained a Deep Convolutional Generative Adversarial Network from the MNIST dataset to generate handwritten like numbers
- **Star-Elliptical-Spiral galaxy Classifier** - Classifiers fine tuned to classify stars and galaxies, and Elliptical and Spiral galaxies from SDSS data; later catenated to give final probability

Necessary hyperlinks have been created on some of the bold texts

AWARDS AND SCHOLARSHIPS

- **Physics Alumni Student Scholarship (2020 - 2022)** - Scholarship granted annually by the Alumnus of the Physics department of Madras Christian College for academic excellence during the preceding academic year.
- **Gold Honour Certificate (2020)** - presented for securing over 30 points out of 40 in the finals of the International Astronomy and Astrophysics Competition.
- **Best Outgoing Student (2019)** - awarded to the student graduating high school with excellent academics through out the academic year by AMM Matric Higher Sec School.
- **AMM School Scholarship (2014 - 2019)** - Scholarship granted annually by AMM Matric Higher Sec School based on the academic performance during the academic year.

ONLINE COURSES

- **International Advanced Space Science Course** - Indian Astrobiology Research Foundation
- **Data-driven Astronomy** - The University of Sydney
- **Neural Networks and Deep Learning** - deeplearning.ai
- **Improving Deep Neural Networks** - deeplearning.ai
- **Structuring Machine Learning Projects** - deeplearning.ai
- **Introduction into General Theory of Relativity** - HSE University (Audited)
- **Convolutional Neural Networks** - deeplearning.ai (Audited)
- **Build Basic Generative Adversarial Networks (GANs)** - deeplearning.ai (Audited)

INDEPENDENT STUDIES AND AUDITED LECTURES

- **Post Newtonian theory** - Landau–Lifshitz formulation, Relaxed Einstein equations, Post Minkowskian approach to Near zone and Wave zone metric approximations, Metric approximations in Post Newtonian case
- **International Winter School on Gravity and Light Lecture Series - Fredric P Schuller** - Manifolds, Fields, Connections, Parallel transport, Curvature, Einstein's Field equations, Penrose diagram, Pertubation of spacetime
- **Geometric Anatomy of Theoretical Physics Lecture Series - Frederic P Schuller** - Logic of propositions and predicates, Axioms of Set theory, Classification of Sets, Topological Spaces, Topological Manifolds, Tangent bundles, Differential Manifolds
- **Summer School on Gravitational Wave Astronomy Lecture Series - 2019 - International Centre for Theoretical Sciences** - Advanced General Relativity, Gravitational waves from Post Newtonian sources

Texts - *Gravity : Newtonian, Post-Newtonian, Relativistic* - Clifford M. Will, Eric Poisson, *Geometrical methods in Mathematical Physics* - Bernard F. Schutz, *General Theory of Relativity* - P.A.M. Dirac, *A First Course in General Relativity* - Bernard F. Schutz, *Spacetime and Geometry : Introduction to General Relativity* - Sean Carroll

WORKSHOPS AND CONFERENCES

- **Astrophysics & Post processing techniques** - Positron Foundation (Aug 2019)
- **Gravitational Wave Open Data Workshop** (May 2021)
- **Code/Astro** - week-long astronomy software development workshop (June 2021)
- **PyHEP - HEP software Foundation** (July 2021)
- **KAGRA International Workshop** (July 2021)

SKILLS

- **Programming skills** - Python (Proficient), C/C++, LaTeX
- **Softwares** - Mathematica, Sagemath, Blender, FreeCAD, Deep Sky Stacker
- **Frameworks and tools** - Tensorflow, Pytorch, Fastai, OpenCV, Numpy, SciPy, Astropy, PyCBC, GWpy, lensinggw, ligo.skymap

Necessary hyperlinks have been created on some of the bold texts

EXTRA-CURRICULAR

- Intercollegiate PPT presentations
  - Intro to Gamma Ray Bursts
  - Employing Deep Learning in Protoplanetaery systems
  - Are black holes traversable?
- National Service Scheme Volunteer
  - Took part in events and campaigned on Road safety, No smoking, Flood safety measures, etc.
  - Camped for a week in the city outskirts to help the neighbourhood and clean several places around. Surveyed the common problems faced by the people in the community to try to resolve them.
- Played for the School and College Cricket Team
- Languages - English (Proficient), Tamil (Native), French (Basic)

REFERENCES

Prof. Larny Mary Jayan **larnyjayan@mcc.edu.in**
Assitant Professor, Department of physics
Madras Christian College

Dr. Caroline Victoria **ecarolinevictoria@mcc.edu.in**
Assitant Professor, Department of physics
Madras Christian College

Necessary hyperlinks have been created on some of the bold texts