

Myank Singhal

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Education

Charles University, Prague

PHD IN PHYSICS

Mar. 2022 - Present

- Supervisors: **Dr. Ladislav Šubr**
- Evolution of systems in Galactic Nucleus with N body simulations.**: This research project involves studying N-body systems to understand evolution of systems in galactic centers, focusing on the Milky Way's Galactic Center.

University of Bristol, UK

M.Sc. IN PHYSICS BY RESEARCH

Sep. 2020 - Dec 2021

- Supervisors: **Dr. Sotiria Fotopolou & Prof Malcolm Bremer**
- Star-Galaxy classification with a novel neural network architecture.** This research project involved using machine learning algorithms and SED fitting to classify stars from galaxies using broadband photometry. The machine learning algorithm was designed to account for uncertainty and missing photometry.
- Thesis titled "*Star-Galaxy classification with a novel neural network architecture*" is available online.

University of California, Los Angeles, USA

B.Sc. IN ASTROPHYSICS

Upper Div GPA: 3.858

Sep. 2016 - Dec. 2019

- Department Highest Honors in Astrophysics
- Dean's Honors List:** Fall 2016, Spring 2017, Spring 2018, Fall 2018, Spring 2019

Research Experience

Dynamical Coupling of Keplerian Orbits in Relativistic Gravity

PHD CANDIDATE

Charles University

Feb 2022 - May 2024

- Worked on an analytic expression to describe evolution of keplerian orbits in relativistic gravity around massive bodies when perturbed by a distant perturber.
- Performed both few body simulations and N-body simulations to showcase various modes of the coupling.
- Provides theoretical predictions for survival of large scale disk-like structures in the Galactic Center.
- Academic paper titled "**Dynamical coupling of Keplerian orbits in a hierarchical four-body system: from the Galactic Centre to compact planetary systems**" is available online.

Star Galaxy classification using ML with Dr. Sotiria Fotopoulou and Professor Malcolm Bremer

MASTERS BY RESEARCH STUDENT

University of Bristol

Sep. 2020 - Dec 2021

- Used photometry to classify stars from galaxies using SED fitting and machine learning algorithms
- Developed a neural network architecture called StarMAP that can classify objects with missing and augmented photometry with high classification accuracy.
- The work is aimed to accurately classify objects with Euclid like photometric bands and importance of Wise filters is also discussed.
- Thesis titled "**Star-Galaxy classification with a novel neural network architecture**" is available online.

Light Curve Analysis for RR Lyrae Variable Stars with Professor Harinder P. Singh

RESEARCH ASSISTANT

Delhi University

Dec. 2019 - Aug 2020

- Worked on 274 theoretically generated light curves of RR Lyrae variable stars obtained from Marconi et al.(2013).
- Made a Sequential Neural Network program to interpolate light curves in the I-band for values of the 6 input parameters (Mass, Luminosity, Periodicity, Temperature and Stellar Composition [X,Z]) not in the generated set.
- Generated light curves sequentially based on the 6 input parameters.
- Matched interpolated light curves with empirical light curves to find properties of the RR Lyrae Variable Stars.

Stellar Radio Data Analysis for SETI with Professor Jean-Luc Margot

RESEARCH ASSISTANT

UCLA

Apr. 2018 - Jun. 2019

- Analyzed the radio data of 17 G5 stars in the Milky Way for extra-terrestrial radio signals from planets near these stars.
- Worked on a Graphical User Interface (GUI) to label the data-set in an user friendly way for a future citizen science project.
- Created a labeled data-set containing radio signals of common earth-bound satellites and other terrestrial sources.
- Designed a Neural Network to identify the earth-bound satellites from the complete data-set of more than 800,000 signals.
- n^{th} author in "**A Search for Technosignatures Around 31 Sun-like Stars with the Green Bank Telescope at 1.15–1.73 GHz**", which has been published in the Astronomical Journal.

Relevant Projects

Collision Detecting Autonomous Drone

UCLA

MADE WITH 3D4E AT UCLA

Mar. 2018 - Apr. 2018

- Designed and 3D printed a drone with a camera and rudimentary machine learning to avoid collisions.
- Used an Ardupilot to enable way-point autonomous flight, YOLO (You Only Look Once) Neural Network coded in Python and running it on an Arduino to enable collision detection.

Video Game: FearMe

UCLA

HTTP://BIT.LY/FEAR_ME

Apr. 2018

- Designed and made a horror game in Unity and C which adapts to the user in real time based on their brain waves as captured by a Muse headband.
- Collected data from the Muse headband using a python script and designed a neural network to identify the emotion of the user which would affect the gameplay.
- The game received the *Best Gaming Hack Award* at LA Hacks 2018.

Food Recognition on Mobile

UCLA

IOS APP

Nov. 2017

- Developed an iOS app which can identify a food item the camera sees and presents the nutritional information.
- Retrained the Inception v2 neural network to identify food and used the USDA NDB API to display the nutritional data.

Raffle Master

UCLA

IOS APP

Mar. 2017

- Developed an iOS app to digitize the local lottery system which uses Amazon AWS to store user data.
- The app can be used to create a new raffle with a QR code, allows users to join the raffle by scanning the QR code and also allows the creator to pick a winner.

Honors & Awards

2023	Mobility Grant , Charles University	Czech Republic
2024	Mobility Grant , Charles University	Czech Republic
2023- 2026	Research Grant , Grant Agency of Charles University	Czech Republic
2019	Department Highest Honors in Astrophysics , University of California, Los Angeles	U.S.A
Spring 2019	Deans Honor List , University of California, Los Angeles	U.S.A
Fall 2018	Deans Honor List , University of California, Los Angeles	U.S.A
Spring 2018	Deans Honor List , University of California, Los Angeles	U.S.A
2018	Best Gaming Hack Award , LA Hacks	U.S.A
Spring 2017	Deans Honor List , University of California, Los Angeles	U.S.A
Fall 2016	Deans Honor List , University of California, Los Angeles	U.S.A

Outreach

Astronomy on Tap

Köln

TALK

14 November 2024

- Presented a talk to a general audience on the galactic center of Milky Way galaxy.
- The talk focused on how the observation of the Galactic Center provides us evidence for the theory of general relativity.

Aerospace Bristol

Bristol

TALK

12 July 2021

- Presented a talk to year 9 - 11 students and introduce them to astrophysics research.
- The talk titled *"Using Machine Learning to Classify Stars"* is available online on YouTube

Science Lab Teaching Club

UCLA

SCIENCE OUTREACH MEMBER & TREASURER IN 2019

Sep. 2016 - December 2019

- Taught energy, fundamental forces, relativity, space-time, and non-newtonian fluids using interactive demonstrations to spark interest in elementary school students.
- Set up and demonstrated practical experiments on electromagnetic forces and induction at Explore Your Universe Fair held at UCLA in 2018 and 2019.
- Taught middle school kids about the Bohr atomic model and transitions at the Martin Luther King Junior Fair held at UCLA.
- Managed the funds of the club and ordered supplies for various presentations.

Specialized Skills

- **Computer Skills:** C++, Fortran, Java, Python (Tensorflow, Numpy, Scipy, Pandas, Plotly, Astropy) , High Performance Parallel Computing (OpenCL, MPI, OpenMP), SQL, Mathematica, Swift, Octave, LaTeX, Linux and Git.
- **Lab Skills:** Soldering, Circuit electronics and Microprocessors

Publications

- Florian Peißker, Michal Zajaček ... [Myank Singhal et. al.](#) (2024) **Candidate young stellar objects in the S-cluster: Kinematic analysis of a subpopulation of the low-mass G objects close to Sgr A***
- [Myank Singhal](#), Ladislav Subr, Jaroslav Haas (2024) **"Dynamical coupling of Keplerian orbits in a hierarchical four-body system: from the Galactic Centre to compact planetary systems"**
- Jean-Luc Margot, Pavlo Pinchuk ... [Myank Singhal et. al.](#) (2021) **A Search for Technosignatures Around 31 Sun-like Stars with the Green Bank Telescope at 1.15–1.73 GHz**