# Arun Ravishankar

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## About me

I'm a Theoretical Physicist studying the stability of black holes. I am keen to leverage my diverse and strong mathematical background to tackle important, interesting and challenging problems that create value for the world. Being interested in fundamental physics and wanting to work on cutting-edge work that is impactful, I would like to work on problems in quantum computing such as quantum algorithms and optimization techniques as well as explore the applications of these techniques.

## Education

**PhD in Physics** Expected Fall. 2020

**MS. in Physics** May 2019

University of Arizona, Tucson, AZ, USA

**MSc (hons.). in Physics**

*(with thesis at LMU, Munich, Germany)* May 2014

**B.Pharmacy (hons.)**

Birla Institute of Technology & Science Pilani, India

## Skills

### Programming Languages & OS

Python, Wolfram Mathematica, R, LaTeX
Linux, MacOS, Windows

### Packages and Platforms

Numpy, Scipy, Matplotlib, Scikit-Learn, Pandas, Keras*, Tensorflow*, Seaborn*
Github, Jupyter

### Data Analysis

Data Visualization, Machine Learning & Deep Learning, High Performance Computing

*Tutorials/Workshop

## Conferences

### Physics

- Invited as a guest speaker at Chennai Mathematical Institute, India in July 2019
- Presented at the American Physical Society, April Meeting 2019 in Denver, CO
- Presented at the Pacific Coast Gravity Meet, March 2018 in CalTech, Pasadena, CA

## Work Experience

### Physics

Univ. of Arizona, USA

Graduate Research Associate — Fall 15 - Current

- Discovered an instability of a maximally charged black hole (Ravishankar, A, et al. J. High Energ. Phys. (2018) 2018: 87) - doi.org/10.1007/JHEP12(2018)087.
- Identified the cause of the instability to be certain null geodesics (Ravishankar, A, et al. J. High Energ. Phys. (2020) 2020:94) - doi.org/10.1007/JHEP05(2020)094
- Designed and ran simulations in Python on a supercomputer (El Gato) by parallel job scheduling with PBS scripts to investigate the instability.

Graduate Teaching Associate

- Conducted introductory physics lab sessions (~25 students per lab) for undergraduate students and received very good reviews from my students.
- Led discussion sessions (~100 students per section) where I guided groups of students (~4 students per group) to work together to solve problem sets.
- Conducted lectures and tutorials to help students that needed more time and help in understanding the subject.

Foundations of Quantum Mechanics and Quantum Computation — BITS, India & LMU, Germany, Spring 13 - Summer 14

- Worked on a project to understand Bell's inequalities and the EPR paradox which led me to get interested in the quantum foundations.
- For my Master's thesis, I analyzed the problem of describing arrival time distributions in quantum physics in the context of POVMs and Bohmian mechanics.
- In a course on Quantum Information & Quantum Computing (highest possible grade received - top 10% of class), was introduced to quantum algorithms and quantum error correction. For a reading project, I worked on understanding the Peres-Horodecki separability criterion.

### Independent work

(Details on my webpage - arunravishankar.github.io)

- Wrote a program to simulate an epidemic (the spread of a disease through a community) with various parameters. The model highlights the importance of social distancing and personal protective equipment.
- Analyzed histology tiles of Colorectal cancer patients - used clustering algorithms to understand the data better. Built a Convolutional Neural Network model to predict the type of tissue of a given image.
- Built and compared classification models to predict a patient's risk of being diagnosed with Cervical Cancer.

### Startup - Fascination Based Learning

Munich, Germany

Content Producer — Fall 13 - Summer 14

- Worked on the incubation stages of a startup for online-based education with the founder of Ideas Roadshow and The Founding Executive Director of the Perimeter Institute for Theoretical Physics, Waterloo, Canada, Dr. Howard Burton.
- Coordinated with an interdisciplinary team of entrepreneurs, educationalists, researchers and philosophers to come up with a working form of the online tool.
- Created appropriate content for the preliminary product based on lectures in cosmology by Prof. Roger Penrose which was then used to pitch the product to different universities including the National University of Singapore.