Ankush G. K. (un-koo-sh)

(Ankush Gargeshwari Kumar)

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EDUCATION

M.Sc. **Physics** and B.E. **Mechanical Engineering** (Integrated) with Thesis
CGPA: 7.862/10.0

BITS Pilani
Hyderabad Campus
Hyderabad, India
2017 – 2022

EXPERIENCE / PROJECTS

Active Nematic Patterns on Manifolds

Project
Supervisor: Dr. Vijaykumar Krishnamurthy

International Centre for Theoretical Sciences (ICTS-TIFR)
Bengaluru, India

Aug 2022 – Present

- Simulating nematics with tensorial order parameter under the Landau-De Gennes framework using FEniCS

Quantification of mixing of two liquids in small-scale, low Re open flows

Project
Supervisors: Dr. Meenakshi Viswanathan *and* Dr. Aravinda N. Raghavan

BITS Pilani
Hyderabad Campus
Hyderabad, India

Jan 2022 – Present

- Quantified two different flow fields: An Oscillatory flow (in the presence of a Tear-Drop shaped obstacle), and a flow with entrained vortex (due to a pair of baffle), using Okubo-Weiss parameter (Q) distinguishing the stretched and rotational parts of the flow.
- Found that the stirring due to Tear-drop obstacle and baffles gave rise to a sequence of: stretch, rotation and stretch, which sharpened the concentration gradient leading to higher mixing.
- Trying to connect the topological features of the flow, Q and the onset of chaotic behaviour to quantify mixing in small-scale open flows.

Growth Dynamics of Filamentous Fungal Biofilms

Thesis *(Remote Work)* - Link
Supervisor: Dr. Aravinda N. Raghavan

BITS Pilani
Hyderabad Campus
Hyderabad, India

Jan 2022 – May 2022

- Worked with the team involved in the study of the properties of filamentous fungal biofilms – used in treating industrial effluents.
- Simulated a mesoscopic model of biofilm growth with five main components: active part density, inactive part density, tip density, internal concentration and external concentration.
- Varied the internal, external concentration and the geometry to mimic the experimental observations.

Coupling of Electrophysiology and Mechanics of Heart Muscle
Thesis *(Remote Work)* - Link
Supervisor: Dr. Yong Wang

Max-Planck Institute for Dynamics and Self-organization (MPI-DS)
Gottingen, Germany

Aug 2021 – Dec 2021

- Worked as part of the group whose aim is to build an Engineered Heart Muscle patch to treat diseased hearts.
- Simulated a coupled model of an excitable domain where an electrical impulse propagates, and deforms the domain at its wake – using COMSOL.
- Focussed on one-way coupling where the electrophysiology (FitzHugh Nagumo model) dictates how the domain deforms (hyperelastic material model) and not vice versa.

Analysis of Surface Ozone variation
Summer Internship *(Remote Work)* - Link
Supervisor: Dr. Narendra Ojha

Physical Research Laboratory (PRL)
Ahmedabad, India

May 2021 – July 2021

- Applied Linear and Multiple Linear Regression models to predict Surface Ozone levels and compared it with the existing data.
- Used Nitrous Oxides, Temperature and Relative Humidity as the training data for Surface Ozone prediction.
- Found that the relationship between Surface Ozone and its precursors is highly non-linear and Linear Regression models are not suitable.

General Relativity and LISA
Summer Internship - Link
Supervisor: Prof. Sanjeev Dhurandhar

Inter-University Center for Astronomy and Astrophysics (IUCAA)
Pune, India

May 2019 – July 2019

- Learnt the fundamentals of Special and General Theory of Relativity.
- Applied the concept to address the problem of flexing of Laser Interferometer Space Antenna (LISA)'s arms.

SCHOOLS & WORKSHOPS

- Bangalore School on Statistical Physics – XIII
  - Pattern Formation in Biology
  - Statistical Physics of Long-range Systems

International Centre for Theoretical Sciences (ICTS TIFR)
Bangalore, India

July 2022

- FINESSE Workshop: Hands-On Interferometer Modelling

Inter-University Centre for Astronomy and Astrophysics (IUCAA)
Pune, India

Dec 2019

RELEVANT COURSES

- Statistical Mechanics (Stanford Theoretical Minimum Series) [online]
- Finite Element Method for Problems in Physics (University of Michigan) [online]
- Probability & Statistics
- Mathematical Methods in Physics
- Fluid Mechanics
- Computational Physics
- Multivariable Calculus
- Computer Programming
- Mechanics of Solids
- Electromagnetic Theory

SKILLS & ACTIVITIES

- **Computing/Software**: Python, MATLAB, COMSOL Multiphysics, LaTeX
- **Activities:**
  - Led the University Ultimate Frisbee Team
  - Part of the Physics Association conducting events and talks for the university audience.