Sriram Sankar

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INTERESTS

Extragalactic astrophysics, baryon cycle, gas kinematics, galaxy environments, galaxy evolution & dynamics

FORMAL EDUCATION

UNIVERSITY OF CAPE TOWN

MSc. Astronomy | 2021-23
Cape Town, South Africa

MAHATMA GANDHI UNIVERSITY

B.Tech Mechanical Engr. | 2014-18
Kottayam, Kerala, India

TECHNICAL SKILLS

Programming:
PYTHON • IDL/GDL • C/C++ • BASH • SQL

Workflow:
SLURM • DOCKER/SINGULARITY • GIT
VSC • AWS • ZOTERO

Selected Astronomy tools:
CASA • CARACAL • SOFIA2 • SLICERASTRO
CARTA • ^{3D}BAROLO • CLOUDY • GIZMO
YT • ASTROPY • SPECTRAL-CUBE
GAUSSPY+ • PYSPECKIT

Web technologies:
HTML5/CSS3• JAMSTACK • WORDPRESS

Open Source Contributions:
BAYGAUD-PI, YT_ASTRO_ANALYSIS

OBSERVING TRAINING

SALT Shadow Program:
I shadowed a SALT Astronomer for a week.

SAAO 1.9m Training:
I underwent training to observe with the SpUpNIC spectrograph.

TUTORING

AST3003S: Galactic and Extragalactic Astrophysics; third year course taught by Prof. Patrick Woudt

OUTREACH

Outreach Volunteers Club:
I started a club at SAAO for staff and students interested in outreach.

RESEARCH EXPERIENCE

TEL AVIV UNIVERSITY (TAU)

Visiting Research Student | Aug - Sep 2023 | Tel Aviv, Israel

Supervisor: Dr. Jonathan Stern

- I explored the formation of warps and anomalous gas due to misaligned gas accretion resulting from cooling flows in the Circumgalactic Medium (CGM).
- I employed analytical calculations, idealized hydrodynamic simulations, and comparison with observations.

SOUTH AFRICAN ASTRONOMICAL OBSERVATORY (SAAO)

MSc. Research Student | Feb 2021 – July 2023 | Cape Town, South Africa

Supervisors: Dr. Moses Mogotsi & Prof. Matthew A. Bershady

- I was funded by the **SALT-SAAO Prize MSc Scholarship 2021**
- For my **dissertation**, I developed a novel method to separate anomalous gas and the rotating disc using 3D tilted ring modelling and physically motivated Gaussian decomposition and kinematic tagging. I applied this technique to interacting galaxies in two groups to characterize the gas flows.
- Interferometric data reduction, multi-dimensional data analysis and visualisation.

INDIAN INSTITUTE OF SPACE SCIENCE AND TECHNOLOGY (IIST)

Project Student | Jan 2019 – Jan 2021 | Trivandrum, Kerala

Supervisor: Prof. Anand Narayanan

- I employed multi-component Voigt profile fitting and component-by-component modelling to extract information on the small-scale metallicity-density-temperature structure of multi-phase absorbing gas in different environments.
- This collaboration led to three publications including my first, first-author paper. Wherein we combined UV-HST and Optical-Keck archival observations to study five intermediate redshift absorbers likely tracing the CGM.
- UV/optical data reduction and analysis, ionization modelling, database mining, etc.

REFEREED PUBLICATIONS

- **S. Sankar**, A. Narayanan, B.D. Savage, V. Khaire, B.E Rosenwasser, J.C. Charlton, and B.P. Wakker "**Physical conditions of five O VI absorption systems towards PG** $1522+101$" MNRAS 498 (Sep 1, 2020): 4864–86.
- J. Pradeep, **S. Sankar**, T.M. Umasree, A. Narayanan, V. Khaire, M. Gebhardt, Sameer, and J.C. Charlton "**Solar-metallicity gas in the extended halo of a galaxy at** $z \sim 0.12$" MNRAS 493, no. 1 (Mar 21, 2020): 250–66.
- Sameer, J.C. Charlton, G.G. Kacprzak, A. Narayanan, **S. Sankar**, P. Richter, B.P. Wakker, N.M Nielson, C.W. Churchill "**Probing the physicochemical properties of the Leo Ring and the Leo I group**" MNRAS 510 (Mar 1, 2022): 5796-5820.

TELESCOPE TIME

- **MeerRings - PI & Technical Lead - 50 hours**: 2023 open time **MeerKAT program** to map HI and L-band continuum in 7 Collisional Ring Galaxies (CRGs).
- **MeerChoirs - Co-I - 50 hours**: 2022 open time **MeerKAT program** to study the effect of group environment on galaxy evolution by mapping HI in 8 groups
- **SALTChoirs - PI - 21.4 P1 hours**: 2021 semester 2 **RSS/SALT program** to map ionized gas in 2 Choir groups.

RECENT PRESENTATIONS

- Colloquium talk on **anomalous gas safari: insights from MeerKAT's view of galaxy interactions** at SAAO - July 2023, Cape Town
- Talk on **looking for anomalous gas in interacting galaxies** at the meeting of the **SKA Pathfinder HI Survey Coordination Committee (PHISCC)** - March 2023, Cape Town
- Lunch talk on the **neutral gas kinematics of interacting galaxies in two groups** at **Kapteyn, University of Groningen** - Sep 2022, Dwingeloo, The Netherlands
- Short talk on the **neutral gas kinematics of interacting galaxies in a group** at **What Matters Around Galaxies (WMAG)** - Sep 2022, The Alps, Italy

Open Night Volunteer:
I regularly volunteered to organize stargazing sessions, talks, and tours

Visitor's Centre Exhibition:
I prepared the script for an exhibition on the history of astronomy in South Africa.

COURSEWORK

CLASSES AUDITED [1]

UCT - NASSP Master's 2021
Extragalactic Astronomy
Radio Interferometry

IIST - Master's 2019
Introduction to Astronomy
Cosmology
Galaxies and Extragalactic Astronomy

Other
Quantum Mechanics
Statistical Mechanics

UNDERGRADUATE

Aerospace Engineering
Gas Dynamics and Jet Propulsion
Heat and Mass Transfer
Fluid Mechanics and Thermodynamics
Engineering Physics
Engineering Mathematics *(5 Semesters)*

LEADERSHIP AND VOLUNTEERING

TEDXFISAT

Founding Organizer

Feb 2018 - Oct 2018 | FISAT
I planned and organized a TEDx event.

MECHFISAT

Founding Captain

Aug 2017-18 | FISAT
I set up a department portfolio and library website. I trained a team of 50 students in various aspects of website building and content marketing.

ASME FISAT SECTION

Chairman

Aug 2017-18 | FISAT
I organized various events and activities in connection with ASME. I conducted several induction programs for nascent student sections across the state.

OTHER EXPERIENCE

Graphic Designing, Creative Writing, Website Development, Event Management

[1] No credits

- Short talk on the **Baryon Cycle in groups with varying levels of interactions** at the **Annual Conference of the South African Institute of Physics (SAIP)** - **Best MSc Oral Presentation Prize in the Astrophysics division** - Jul 2022, Virtual
- Short talk on the **Baryon Cycle** at the **Annual Conference of African Astronomical Society (AfAS)** - Mar 2022, Cape Town

SCHOOLS & WORKSHOPS

- **ERIS 2022: European Radio Interferometry School**
  Week long summer school in September, 2022 at ASTRON, Dwingeloo, Netherlands.
- **Spectroscopy Tools Workshop by STScI**
  4 day virtual workshop in late March, 2022 that introduced the functionalities of various open-source spectroscopic analyses tools.
- **ARIWS 2021: African Radio Interferometry Winter School**
  Week long virtual interferometry school in late June, 2021.
- **ESCAPE summer school**
  Week long virtual school in June, 2021 on project development and data science for astrophysical research.
- **Fundamental of Gaseous Halos Workshop by KITP**
  2 month virtual workshop from Jan 11 to Mar 5 2021 on theoretical and observational aspects of the Circumgalactic Medium.

OTHER ACTIVITIES

- Organiser for the fortnightly **Extragalactic Discussion Group.** - I initiated and organized the extragalactic discussion group for researchers at SAAO and UCT
- SAAO postgrad **Student Representative.** - I helped with organising writing circles, social events, meetings, and other student activities.
- Championed the **Green SAAO Sustainability Movement at SAAO.** - I worked with site management to implement a sustainable **waste management system**, initiated **campaigns for optimal resource utilization**, and introduced **climate change communication** in outreach activities.

PAST PROJECTS

PET-CNT NANOCOMPOSITE | Team Lead

Feb 2018 – Aug 2018 | FISAT, Kerala

Thesis Guide: Dr. Rejeesh C R
We attempted to recover the structural stability after iterations of plastic recycling through reinforcement with Carbon Nanotubes (CNTs). The project was intended as a step towards a closed-loop production system with additive manufacturing.

CARBON NANO-TUBE SYNTHESIS | Project Student

Jan 2018 | Tata Institute of Fundamental Research (TIFR), Hyderabad

Guide: Dr. T. N. Narayanan
We grew CNTs using a tri-metallic catalyst (Co-Ni-Fe) and characterised them with Scanning Electron Microscopy and Raman Spectroscopy.

EXOSKELETAL IMMOBILIZER | Team lead

Mar 2017 - Dec 2017 | FISAT, Kerala
We presented our 3D-printed fracture cast equipped with adjunct modalities to facilitate faster healing in Tampa, Florida. This was **published as part of ASME IMECE.**

REFERENCE

Dr. Moses Mogotsi | m.mogotsi@saao.nrf.ac.za
SALT Astronomer, South African Astronomical Observatory, Cape Town, South Africa

Prof. Anand Narayanan | anand@iist.ac.in
Professor, Indian Institute of Space Science and Technology, Kerala, India

Prof. Petri Vaisanen | petri@saao.ac.za
Director, South African Astronomical Observatory, Cape Town, South Africa