

Jiten Dhandha

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EDUCATION

- **Institute of Astronomy, University of Cambridge** Cambridge, UK
PhD in Astronomy, supervised by Dr. Anastasia Fialkov and Dr. Eloy de Lera Acedo
Oct. 2022 – Present
 - **Funded by:** [Boustany Astronomy Scholarship](#) & [Isaac Newton Studentship](#)
- **University of Manchester** Manchester, UK
MPhys (Hons) Physics with Astrophysics
Sep. 2018 – Jun. 2022
 - **Course performance:** Average of 82.2% (First Class).
 - **Awards:** Tessella Prize for Software (Jul. 2022), BP Achievement Award (Apr. 2019), IOP PLANCKS Physics competition 7th place (Feb. 2019), Physics Success Scholarship (Dec. 2018)

RESEARCH EXPERIENCE

- **Connecting turbulence to massive star formation** Manchester, UK
4th year MPhys project under Dr. Rowan Smith
Sep. 2021 – Present
 - **Project premise:** using numerical simulations of turbulence in molecular clouds to investigate the prevalence of filamentary hubs, and their link to massive star formation.
 - Gained knowledge of the theory of turbulence and filament formation in collapsing parsec-scale molecular clouds. Also gained experience working with the magnetohydrodynamical simulation code **AREPO**, and filament identification code **DisPerSE**, on the DiRAC supercomputing facility.
 - Studied the effect on different initial turbulent modes and Virial ratios in a suite of 15 simulations by analyzing a variety of properties: probability density functions; filament lengths, masses, line densities; mass statistics of dense, star-forming regions; and their evolution.
 - Developed [fiesta](#), an astrophysical toolkit for studying filamentary networks in density fields defined on unstructured meshes.
- **Modelling the global 21-cm cosmological signal** Manchester, UK
Research assistant under Prof. Jens Chluba
Jun. 2021 – Aug. 2021
 - **Project premise:** recreating the latest models for the hydrogen 21-cm cosmological emission/absorption signals through a large range of redshifts as a module in the recombination code **Recfast++** and thermalization code **CosmoTherm** (both written in C++).
 - Gained knowledge of the atomic and optical physics involved in the recombination, reionization and the dark age epochs of the universe, as well as the evolution of the global 21-cm signal during them.
 - Performed an extensive literature review on the topic, comparing different models and improvements made to them over time.
 - Implemented a [parametric model](#) for reionization and evolution of the 21-cm spin temperature and differential brightness temperature consistent with latest research.
 - As an addition, developed a [Python package](#) wrapping the **Recfast++** code using **Pybind11**, and wrote Jupyter notebooks to document and demonstrate its usage.
- **Imaging of gravitational lens MG0751+2716** Manchester, UK
Research assistant under Dr. Neal Jackson, part of LOFAR-ASTRON group
Jun. 2020 – Sep. 2020
 - **Project premise:** testing and debugging the LOFAR-VLBI calibration and imaging pipeline (written in C++ and Python) using an observation of the gravitational lens system MG0751+2716 from the LOFAR international baseline, and producing a high-resolution image as a result for [publication](#).
 - Gained knowledge of the physics behind the gravitational lensing phenomenon, and the optics involved in long baseline radio interferometry, from taking data to rigorously ‘cleaning’ it for analysis.
 - Gained experience working with a Linux-system and batch processing on a remote computer cluster, specifically the University of Hertfordshire high performance cluster.
 - Gained experience working with complex data structures used for storing large astronomical data; as well as interpreting the physical and computational reasons for the results at different stages of the pipeline.
 - Press coverage of the LOFAR collaboration, which this project was a part of: [ASTRON](#), [BBC](#).

SKILLS

• Software experience

- Proficient in the general-purpose programming languages Python and C++. Competent in Java and the numerical computing language MATLAB. Fluent with markup languages LaTeX and Wikitext.
- Experience with advanced data-analysis methods and data-fitting on Python; for example, see [CFit](#), an open-source curve-fitting tool with a GUI.
- Experience with: working on Linux systems; batch processing on remote clusters; automation using shell scripts; Git development; working with coding pipelines; GUI creation and C++ interfacing in Python; and Python development using virtual-environment setups.

• Hardware experience

- Experience with general undergraduate laboratory equipment such as: circuit components, oscilloscopes and digital controller systems; lenses, light sources, microscopes and other optical devices; and various other miscellaneous equipment like hot plates and chemicals.
- Experience with some special equipment such as: remote control of the 7m telescope at JBCA for galactic hydrogen measurements; remote control of the 42ft telescope at JBCA for pulsar observations; low radioactive sources for gamma-ray spectroscopy; and class 3B laser for optical tweezing.

PUBLICATIONS

• Peer-reviewed

- Fialkov, A., Gessey-Jones, T., **Dhandha, J.**, 2024. Cosmic mysteries and the hydrogen 21-cm line: bridging the gap with lunar observations. *Philosophical Transactions of the Royal Society A* **382**(2271). [doi:10.1098/rsta.2023.0068](#)
- Acharya, S.K., **Dhandha, J.**, Chluba, J., 2022. Can accreting primordial black holes explain the excess radio background? *Monthly Notices of the Royal Astronomical Society* **517**(2), 2454–2461. [doi:10.1093/mnras/stac273](#)
- Badole, S., Venkattu, D., Jackson, N., Wallace, S., **Dhandha, J.**, et al., 2022. High-resolution imaging with the International LOFAR Telescope: Observations of the gravitational lenses MG 0751+2716 and CLASS B1600+434. *Astronomy & Astrophysics* **658**, A7. [doi:10.1051/0004-6361/202141227](#)

• Pre-prints

- O'Hara, O. S. D., Dulwich, F., de Lera Acedo, E., **Dhandha, J.**, et al., 2024. Understanding spectral artefacts in SKA-LOW 21-cm cosmology experiments: the impact of cable reflections. *arXiv:astro-ph.CO*. [arXiv:2402.04008](#)
- **Dhandha, J.**, Faes, Z., Smith, R. J., 2023. Decaying turbulence in molecular clouds: how does it affect filament networks and star formation? *arXiv:astro-ph.GA*. [arXiv:2307.12428](#)

TALKS

• Academic

- “Synergies between 21-cm experiments and JWST observations” *Kavli Institute for Cosmology, Cambridge*. Kavli Science Focus meeting: Science with the 21-cm line. 07 February 2024.
- “Bringing 21-cm simulations to the JWST era” *L-Università ta' Malta*. REACH collaboration annual meeting talk. 26 September 2023.
- “FllamEntary STructure Analysis (**fiesta**)” *University of Manchester*. AREPO-ISM workshop interactive talk. 13 September 2023.
- “Like beads on a string... Where do massive stars in our Universe come from? A brief look into studying our cosmos.” *Pembroke Papers, Pembroke College, University of Cambridge*. In-person outreach-level talk. 27 October 2022.
- “Can accreting primordial black holes explain the excess radio background?” *PDAT Laboratory, K. N. Toosi University of Technology*. Virtual webinar. 17 October 2022.

EXTRACURRICULAR ACTIVITY

• Student Representative body at UoM

Manchester, UK

Student representative & astronomy/astrophysics representative

Sep. 2021 – Jul. 2022

- Helped gather feedback from the student body regarding teaching and course structures for various subjects and presented them to the lecturers at the bi-semester Teaching Review Meetings (TRMs).
- Spear-headed the collation of critical feedback on University's handling of COVID-19 risks for the return to offline assessments in January 2022, including communication, risk mitigation and response to student concerns.

- **University of Manchester Touch Rugby Society**

Manchester, UK

Inclusion officer

Jul. 2020 – Jul. 2022

- Helped ensure that the society was accessible and welcoming to new and experienced players alike, through both online recruitment efforts and in-person guidance.
- Gathered feedback from all players — of different abilities, physical builds, genders, ethnicities — to improve the structure of sessions, rules around playing the game, as well as social events off the pitch.

COVID-19 safety officer

Jul. 2020 - Aug. 2021

- Formulated risk assessments (including COVID-19 related risks) and helped ensure that both society-enforced and national rules regarding social distancing and sanitizing sports equipment were being followed.

- **Peer-assisted study sessions (part of Peer Support Scheme at UoM)**

Manchester, UK

PASS leader

Sep. 2019 – Jun. 2020

- Helped create a relaxed, informal learning environment for a group of 10 first-year students.
- Facilitated critical thinking on topics related to curriculum and beyond by engaging students' interests.
- Created a safe space for advice on personal as well as university-related problems.

- **English Wikipedia**

Volunteer editor

Nov. 2016 – Present

- Helped clean-up existing articles – reverting vandalism, removing copyrighted content, proof-reading and fact-checking them. Restructured and expanded old articles by digging through online and offline resources on several occasions.
- Gained experience working collaboratively on specific issues with people online, as well as guiding new editors through the website policies and guidelines. Also gained experience in dispute resolution between editors through consensus building and diplomatic discussions.
- Reviewed new articles and edits to high-profile pages for approval.