

Inter-University Centre for Astronomy and Astrophysics
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November 29, 2024

Prof. Luisa Lucie-Smith
Universität Hamburg
Hamburg, Germany

Dear Prof. Lucie-Smith,

I am writing to express my interest in the postdoctoral position in cosmology and artificial intelligence at Universität Hamburg. With a background in computational astrophysics and extensive experience in analyzing large-scale structure, I am excited about the opportunity to contribute to your group's innovative research at the intersection of cosmology and machine learning.

During my PhD at IUCAA, I studied the interplay between galaxies and their host dark matter haloes using hydrodynamical cosmological simulations such as IllustrisTNG, EAGLE, and CAMELS. My work often required developing computational techniques to model galaxy formation processes and their impact on dark matter distribution. This sparked my interest in machine learning applications to cosmology, particularly in optimizing data-driven models and exploring fundamental questions in galaxy-halo connections and large-scale structure formation.

I also collaborated with Prof. Hector Marin on applying Bayesian inference methods to infer cosmological parameters from eBOSS data and generate mock DESI datasets. This experience gave me hands-on expertise in implementing advanced statistical techniques and data-driven models—skills that I am eager to extend to machine learning approaches, particularly in areas such as explainable AI, galaxy-halo modeling, and fundamental physics.

The opportunity to join your group at Hamburg Observatory is especially appealing given its vibrant research environment and its emphasis on fostering interdisciplinary collaborations. I am enthusiastic about engaging with colleagues in related fields, leveraging the observatory's ties to DESY and the Quantum Universe Cluster, and contributing to the group's exploration of novel machine learning methods in cosmology.

In addition to conducting original research, I am committed to advancing the principles of diversity and inclusion in academia. As an advocate for mentoring early-career researchers, I look forward to mentoring students and fostering a collaborative and inclusive research atmosphere.

Thank you for considering my application. I look forward to the possibility of discussing my contributions to your group's cutting-edge research.

Sincerely,
Premvijay Velmani,
Senior Research Scholar,
IUCAA Pune, India