

Name: Mainak Singha

Code: 661

Home institution: The Catholic University of America

Name of task: Multiwavelength study of strong emission line galaxies

Role in task/ what they do for CRESST: I am a postdoctoral research associate in the astroparticle physics laboratory. I primarily combine multi-wavelength data, ranging from the Hubble Space Telescope and the Chandra X-ray Observatory to Very Large Baseline Interferometry, to search for supermassive black holes in low metallicity dwarf starburst galaxies. These sources represent the best local analogues of the high-redshift dwarf galaxies that played a crucial role in cosmic reionization – they are akin to living fossils.

Essentially, my research focuses on understanding the physics of cosmic reionization and the role of black holes in it within the local universe. This work is conducted in collaboration with Drs. Sangeeta Malhotra and James Rhoads, my GSFC sponsors.



Background/ Autobiography?

Over the past decade, I've relocated three times, pursuing my academic and research interests across different continents. I obtained my B.Sc in Physics from St. Xavier's College, Kolkata (India), before moving to Ireland. There, I completed my M.Sc in Space Science and Technology, focusing on the analysis of LIGO data pertaining to the first gravitational wave event, GW150914. My interest gradually shifted towards supermassive black hole mergers, prompting me to pursue a Ph.D. at the University of Manitoba, Canada. During my doctoral studies, I investigated supermassive black hole-driven super winds, utilizing multi-wavelength data ranging from radio interferometric observations to X-rays. While black holes serve as significant sources of these winds, I also explored the roles of massive stars and starbursts in driving galactic outflows, with implications not only for their host galaxies but also for the black holes themselves. Recognizing the cosmic reionization process as an invaluable laboratory for understanding these phenomena, I found myself drawn to my current position at Goddard, where I continue to explore the extragalactic sky.

Favorite part of being a CRESST Scientist?

CRESST II has shown to me the joy of astronomy research when collaborating with exceptionally talented scientists and engineers at GSFC. The work ethic and environment here are simply incredible, and I am learning something new every day.

Selected list of publications (First-authored):

1. M. Singha, S. Vaddi, M. Pérez-Torres, N. Winkel, T. A. Davis, B. Husemann, C. P. O’Dea, S.A. Baum, F. Combes, J. Neumann, T. Rose, G. R. Tremblay, 2023 “The Close AGN Reference Survey (CARS) An interplay between radio jets and AGN radiation in the radio-quiet AGN HE 0040–1105”. In: ApJ, arxiv: <https://arxiv.org/abs/2309.16926>
2. M. Singha, C. P. O’Dea, S. A. Baum, 2023 “What Drives the Ionized Gas Outflows in Radio-Quiet AGN?”. In: Galaxies, ADS: <https://ui.adsabs.harvard.edu/abs/2023Galax..11...85S/abstract>
3. M. Singha, B. Husemann, T. Urrutia, C. P. O’Dea, J. Scharwächter, M. Gaspari, F. Combes, R. Nevin, B. A. Terrazas, M. Pérez-Torres, T. Rose, T. A. Davis, G. R. Tremblay, J. Neumann, I. Smirnova-Pinchukova, and S. A. Baum, 2022 “The Close AGN Reference Survey (CARS): Locating the [O III] wing component in luminous local type 1 AGN”. In: A&A, arxiv: <https://arxiv.org/abs/2111.10418>
4. M. Singha, C. P. O’Dea, Y. A. Gordon, C. Lawlor-Forsyth, S. A. Baum, 2021. “Ionized Gas Outflows in Low Excitation Radio Galaxies Are Radiation Driven”. In: ApJ, 918, 65. DOI: 0.3847/1538-4357/ac06c7

List of awards (selected):

Konzelmann Award, University of Manitoba, 2020, 2022

Ernst and Ingrid Bock Award, University of Manitoba, 2021

President’s Student Leadership Program (PSLP) Fellowship, University of Manitoba, 2021

Faculty of Science Cangene Award, University of Manitoba, 2019

University College Dublin Superior Global Graduate Scholarship, 2015