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Outlook of my Research Career

I did my Ph.D. from Bose Institute, India. My thesis was focused on **indirect detection of the signal originating from self-annihilating Dark Matter (DM) candidates.**

As a postdoctoral fellow, I have been working as a **collaborative member of CTA and EOSC-FUTURE Science Projects, under the supervision of Prof. Francesca Calore.**

I am assigned to **Dark Matter Test Science Project (TSP) under EOSC-FUTURE.** My job is to prepare a **Virtual Research Environment (VRE)** to test the indirect studies of DM.

From the context of the CTA-LST collaboration, **I am associated with the project dedicated to the search for Axion-like particles (ALP) with LST1 data.**

My Research Expertise

Indirect Search of Dark Matter (DM) Signal → Main

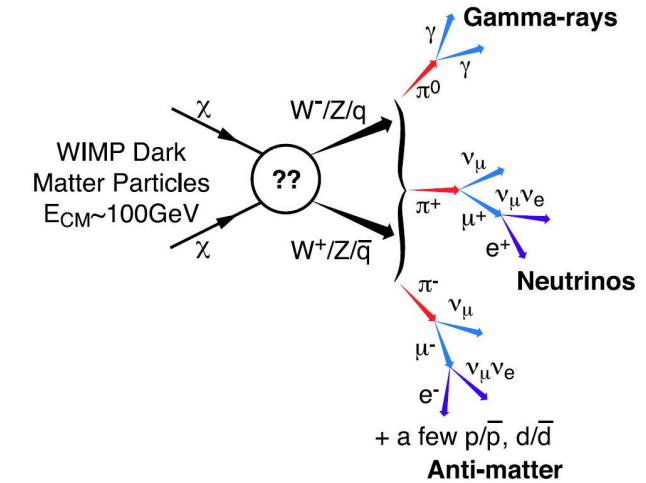
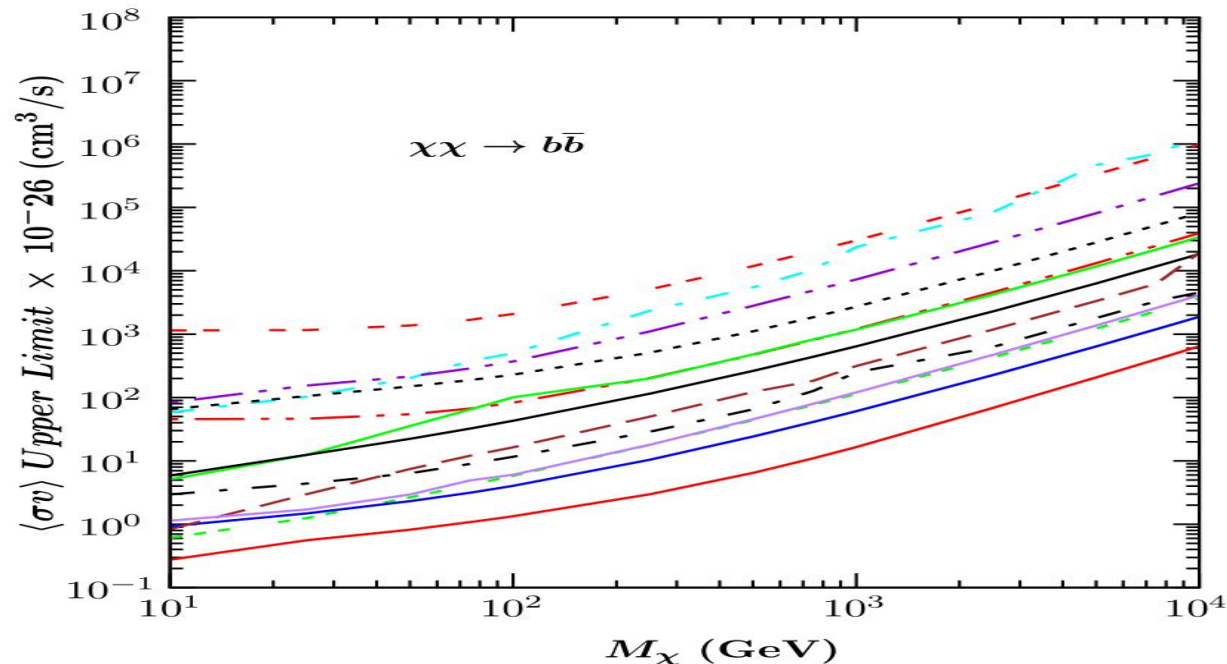
Search for Axion-like-particle from LST-1 data → New Addition

Indirect Search of Dark Matter (DM) Signal

1. In high energy gamma-rays -with Fermi-LAT data ***
2. Complementary- Radio data from VLA & GMRT

Traditional:

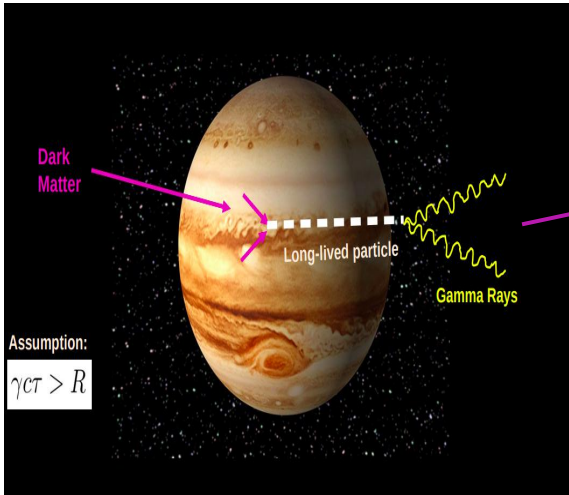
- Traditional search of WIMP annihilation signal from ultra-faint dwarf galaxies (UFDs), Low surface brightness galaxies (LSB) and cluster of galaxies (ongoing).
- Published some works in peer-reviewed Journal



JCAP 06, 041 (2021)

Aquarius II	Horologium I	Tucana II
Carina II	Leo V	Draco
Draco II	Pegasus III	Stacking
Eridanus II	Pisces II	
Grus I	Reticulum II	

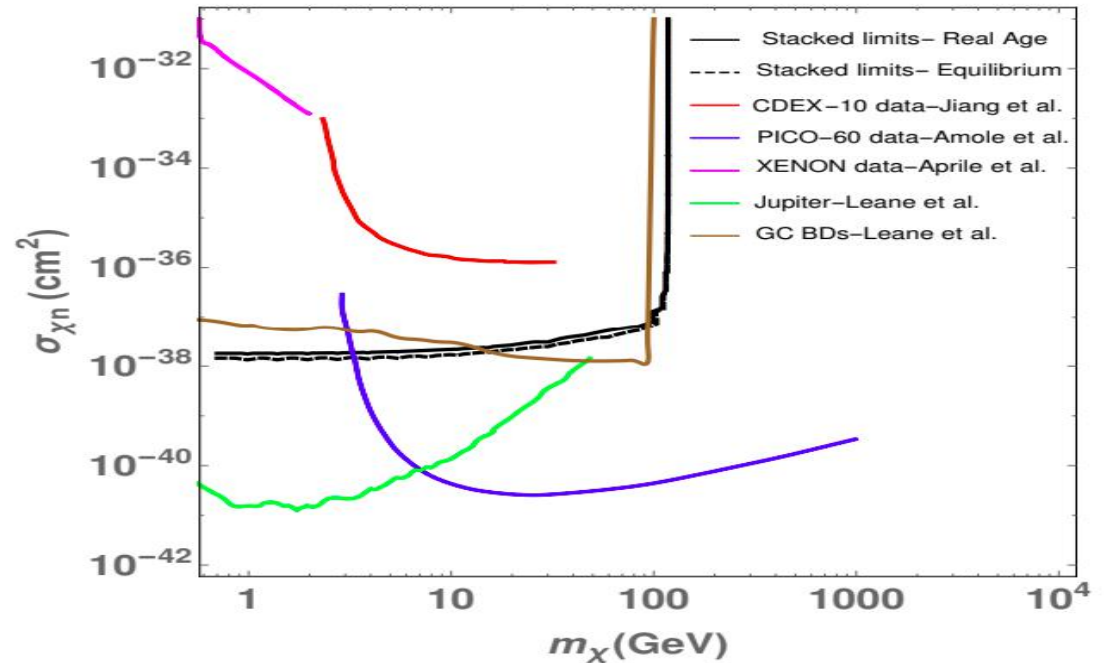
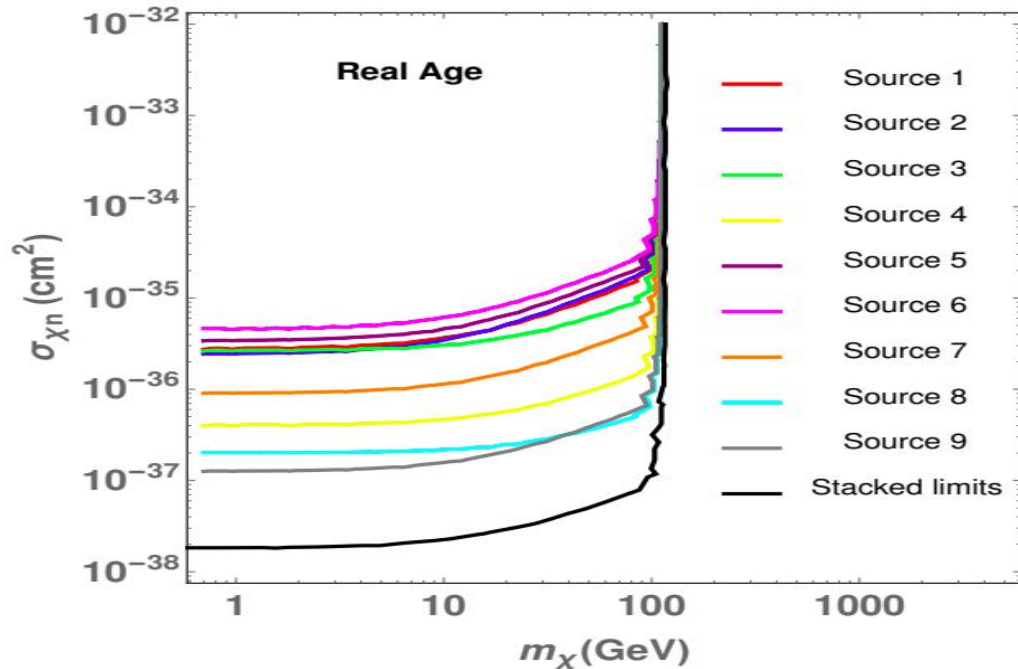
Indirect Search of Dark Matter (DM) Signal

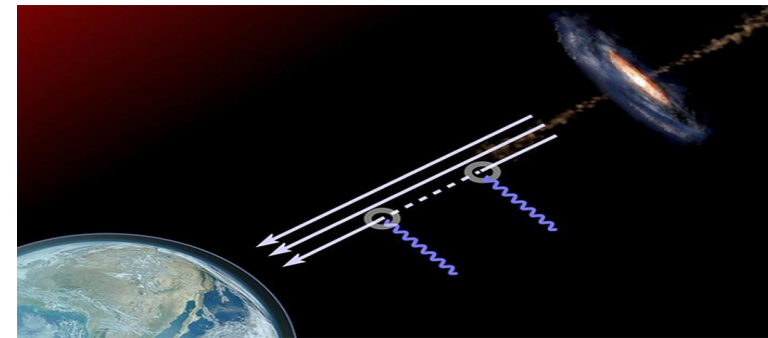


Alternative:

- Probe the Dark Matter capture rate in Celestial bodies.
- Fo far, we have only studied for Brown Dwarf (recently published in PRD).
- We have a plan to extend it for other classes of Celestial objects.

PRD 107, 043012 (2023)

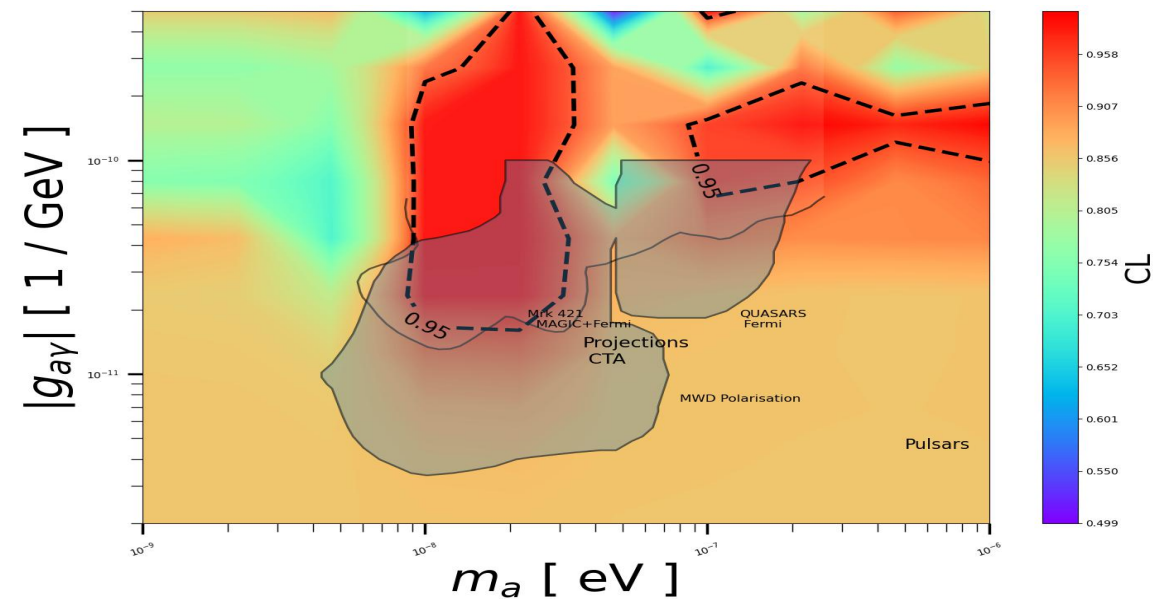
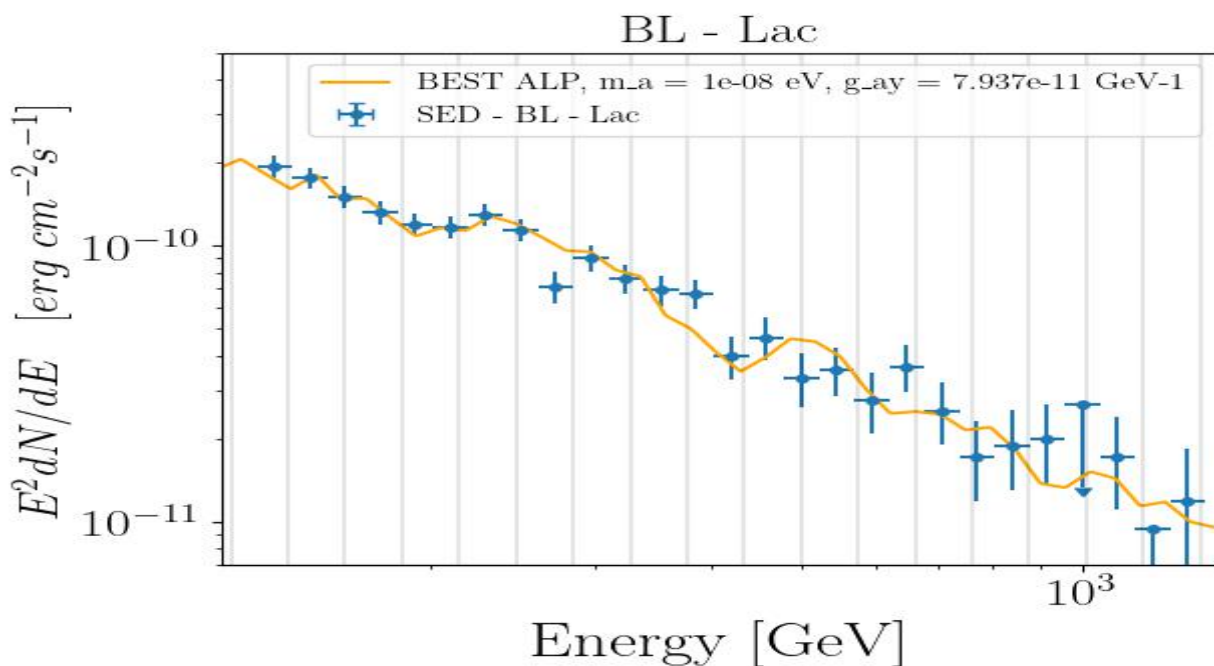




(Image credit: Aurore Simonnet/Sonoma State University/NASA/NOAA/GSFC/Suomi NPP/VIIRS/Norman Kuring)

3. Search for the Axion like particles (ALPs) New*

- Started analysing the LST1 data- using gammapy tools
- Obtained preliminary results
- Expecting to prepare the paper by the end of this year



Published papers

Journals:

- (1) **P. Bhattacharjee**, P. Majumdar, S. Biswas, and P. S. Joarder, '*Analysis of Fermi-LAT data from Tucana-II: possible constraints on the Dark Matter models with an intriguing hint of a signal*', [Journal of Cosmology and Astroparticle Physics](#) 08, 028 (2019), [arXiv:1804.07542 \[astro-ph\]](#)
- (2) S. Biswas, **P. Bhattacharjee**, P. Majumdar, S. Das, M. Das and P. S. Joarder, '*Constraints on dark matter models from the observation of Triangulum-II with the Fermi Large Area Telescope*', [Journal of Cosmology and Astroparticle Physics](#) 11, 003 (2017), [arXiv:1705.00426 \[astro-ph\]](#)
- (3) **P. Bhattacharjee**, P. Majumdar, M. Das, S. Das, S. Biswas and P. S. Joarder, '*Multiwavelength analysis of low surface brightness galaxies to study probable dark matter Signature*', [Monthly Notices of the Royal Astronomical Society](#), Volume 501, Issue 3, March 2021, Pages 4238–4254, [arXiv:1911.00369 \[astro-ph\]](#)
- (4) T. Ergin, L. Saha, **P. Bhattacharjee**, H. Sano, S. Tanaka, P. Majumdar, R. Yamazaki, Y. Fukui, '*Probing the star formation origin of gamma rays from 3FHL J1907.0+0713*', [Monthly Notices of the Royal Astronomical Society](#), Volume 501, Issue 3, March 2021, Pages 4226–4237 [[arXiv:2012.07357](#)] [[astro-ph](#)]
- (5) **P. Bhattacharjee**, D. Choudhury, K. Das, D. K. Ghosh, P. Majumdar, '*Gamma Ray and Synchrotron Radiation from Dark Matter annihilations in Ultra-faint Dwarf Galaxies*', [Journal of Cosmology and Astroparticle Physics](#) 06, 041 (2021), [arXiv:2011.08917](#)
- (6) **P. Bhattacharjee**, F. Calore, and P. D. Serpico, '*Gamma-ray flux limits from brown dwarfs: Implications for dark matter annihilating into long-lived mediators*', [Physical Review D](#) 107, 043012 (2023), [[arXiv:2211.08067](#)]

Proceeding:

(7) P. Bhattacharjee, P. Majumdar, T. Ergin, L. Saha and P. S. Joarder, '*Investigating the region of 3C 397 in High Energy Gamma rays*', [Proceedings of the International Astronomical Union, Issue S331 12, 316 \(2017\), arXiv:1801.05961 \[astro-ph\]](#)

From Arxiv

(8) P. Bhattacharjee, '*Study of potential self-annihilation signal from dark matter particles in some prospective astrophysical dark matter sources*', [arXiv:2208.14763 \(PhD Thesis\)](#)

(9) '*Multi-wavelength study of the galactic PeVatron candidate LHAASO J2108+5157*', [arXiv:2210.00775 \(CTA Collaboration Paper\)](#)