Arkadipta Sarkar

PostDoctoral Scientist · Astroparticle Physics · Gamma Group

Deutsches Elektronen-Synchrotron (DESY), Platanenallee 6, 15738 Zeuthen

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Employment & Education

Deutsches Elektronen-Synchrotron (DESY)

Zeuthen, Germany

PostDoctoral Scientist in Astroparticle Physics (P.I.- Dr. Elisa K. Pueschel) *2022 - PRESENT*

- 40% of time was allocated to technical in-kind contributions for the Cherenkov Telescope Array (CTA).
- 60% of time was allocated to modeling Active Galactic Nuclei (AGN) to understand their physics.

Tata Institute of Fundamental Research (TIFR)

Mumbai, India

Ph.D Research Scholar in Physics (P.I.- Dr. Varsha R. Chitnis) *2018 - 2021*

- Thesis – Geometric Origin of Blazar Variability.

Tata Institute of Fundamental Research (TIFR)

Mumbai, India

M.Sc in Physics *2014 - 2017*

- Thesis – Photon Coincidences at Different Coincidence Windows.

Jadavpur University (JU)

Kolkata, India

B.Sc in Physics *2011 - 2014*

- First Class with Distinction.

Research Experience

Deutsches Elektronen-Synchrotron (DESY)

Zeuthen, Germany

PostDoctoral Scientist in Astroparticle Physics *2022 - PRESENT*

- Developing and maintaining a Python-based message broker (Transients Handler) for the CTA to receive/publish astronomical alerts from/to different telescopes around the world.
- Developing and deploying a web dashboard to publish the AGN spectra observed by CTA.
- Classifying unidentified *Fermi* Large Area Telescope (LAT) sources based on their variability using machine learning [ongoing].
- Simulating the long-term monitoring effort of astronomical sources using CTA subarrays to figure out the optimal monitoring strategy.
- Modeling the time-dependent multi-waveband emission from Blazars.
- Contributing to the Divergent Pointing mode of CTA.

Tata Institute of Fundamental Research (TIFR)

Mumbai, India

Graduate student in High Energy Astrophysics *2018 - 2021*

- Modeling the multi-waveband emissions from AGN to understand their physics.
- Modeling high-energy emissions from AGN in the time domain using stochastic time series models to probe for periodicity.
- Quantitatively probing the effects of geometric motion on AGN emission.
- Developing the simulation pipeline for an upcoming gamma-ray telescope, including training models for background rejection and energy reconstruction.
- Simulating the electronic circuit of the telescope camera to optimize circuit components.

Tata Institute of Fundamental Research (TIFR)

Mumbai, India

Masters student in High Energy Physics *2014 - 2017*

- Performing single photon experiments to probe the fundamentals of quantum optics.
- Performing atomic spectroscopy of different alkali metals to study their hyper-fine spectra.
- Calculating the Clebsch-Gordon Coefficient of the SU(3) group.

Supervision and Volunteering

2022–23 **Topic Coordinator for Frontiers of Astronomy and Space Science**.
2020–23 **Peer reviewed 3+ articles for Monthly Notices of the Royal Astronomical Society**.
2018–23 **Partially supervised 2 PhD Theses and 1 MSc Thesis**.
2018 **Teaching Assistant for the High Energy Astrophysics course**.
2016–18 **Accountant for the TIFR Students Society**.

Awards, Scholarships and Memberships

2022–23 **Member of the Cherenkov Telescope Array Consortium (CTAC)**.
2017–21 **Member of the SiGMA-CT collaboration**.
2014–21 **Scholarship granted by TIFR Graduate School**.
2011–14 **Scholarship granted by the Department of Science and Technology, INSPIRE SHE award**.

Technical Skills

9+ years **Python:**. scikit-learn, statmodels, PyTorch, Plotly/Dash, PyTorch, pandas, astropy, gammapy
5+ years **Astronomical Analysis Tools:**. Fermitools, XSPEC, XRONOS, LAXPCsoft
3+ years **C/C++:**. LAPACK, BLAS, ROOT
3+ years **Simulation Tools:**. CORSIKA, COMSOL, Geant4
3+ years **LaTeX:**. pdflatex, xelatex, lualatex
1+ years **DBMS:**. MongoDB, Redis, SQLAlchemy
0+ years **JavaScript:**. React.js, Plotly.js, Reveal.js

References:

Dr. Elisa K. Pueschel
Ruhr-Universität Bochum — *elisa.pueschel@desy.de*
Universitätsstraße 150, 44801 Bochum, Germnay.

Dr. Kathrin Egberts
Universität Potsdam, Institut für Physik und Astronomie — *kathrin.egberts@uni-potsdam.de*
Campus Golm, Haus 28, Karl-Liebknecht-Str. 24/25, 14476 Potsdam-Golm, Germany.

Dr. Varsha R. Chitnis
Tata Institute of Fundamental Research — *vchitnis@tifr.res.in*
Mumbai, 400005, India.

Conference Talks

CTAO/CTAC General Meeting — *Granada, Spain*
A Dashboard for CTA AGN Spectra — *Apr. 2023*

39th Meeting of the Astronomical Society of India — *Bengaluru, India*
Origin of multi-waveband flare in 3C454.3 — *Feb. 2021*

National symposium on γ-ray astronomy (NSGRA) — *Mumbai, India*
Quasi-periodic oscillations in the light curve of CTA 102 — *Jan. 2020*

AstroSat View of AGN Central Engines — *Pune, India*
HAGAR & Astrosat detection of Markarian 421 flare — *Dec. 2017*

Selected Publications [Link to Full List]

2023	**Performance study update of observations in divergent mode for the Cherenkov Telescope Array**. A. Donini, I Burelli, O Gueta, F Longo, E Pueschel, D Tak, A Vigliano, T Vuillamme, O Sergijenko, A Sarkar.	*38th ICRC Proceedings*
2023	**Variability studies of active galactic nuclei from the long-term monitoring program with the Cherenkov Telescope Array**. G. Grolleron, J.B. González, J. Biteau, M. Cerruti, R. Grau, L. Gréaux, T. Hovatta, J. Lenain, E. Lindfors, W. Max-Moerbeck, D. Miceli, A. Moralejo, K. Nilsson, E. Pueschel, A. Sarkar, S. Suutarinen.	*38th ICRC Proceedings*
2023	**Analog signal processing for large area SiPM in Cherenkov telescope camera**. S.K. Rao, K.S. Gothe, S.S. Upadhya, N.K. Parmar, R.L. Deshmukh, B.B. Singh, S. Kumar, M. Ranjan, A. Sarkar, S.R. Patel, V.R. Chitnis.	*NIMPR, 1051, 168191*
2023	**Study of variability in long-term multiwavelength optical lightcurves of blazar AO 0235+164**. A. Roy, A.C. Gupta, V.R. Chitnis, S.A. Cellone, C.M. Raiteri, G.E. Romero, P.J. Wiita, A. Chatterjee, J.A. Combi, M. Liao, A. Sarkar, M. Villata.	*ApJS, 265, 14*
2022	**Development of Front-End Electronics for an SiPM-Based Cherenkov Telescope Camera**. K.S. Gothe, S.K. Rao, S.S. Upadhya, S. Duhan, B.K. Nagesh, N.K. Parmar, M. Ranjan, B.B. Singh, A. Sarkar.	*Proceedings of the XXIV DAE-BRNS*
2022	**Development of 256-Pixel SiPM-Based Imaging Camera and Its Status**. S.S. Upadhya, A. Chatterjee, V.R. Chitnis, R.L. Deshmukh, P. Dorjey, N. Dorji, S. Duhan, K.S. Gothe, A.P.K. Kutty, B.K. Nagesh, V.A. Nikam, N.K. Parmar, S.R. Patel, M. Ranjan, S.K. Rao, A. Roy, M.N. Saraf, A. Sarkar, B.B. Singh, P. Verma.	*Proceedings of the XXIV DAE-BRNS*
2022	**Detection of a quasi-periodic oscillation in the optical light curve of the remarkable blazar AO 0235+ 164**. A. Roy, V.R. Chitnis, A.C. Gupta, P.J. Wiita, G.E. Romero, S.A. Cellone, A. Chatterjee, J.A. Combi, C.M. Raiteri, A. Sarkar, M. Villata.	*MNRAS, 513, 5238*
2022	**Transient quasi-periodic oscillations at γ-rays in the TeV blazar PKS 1510-089**. A. Roy, A. Sarkar, A. Chatterjee, A.C. Gupta, V.R. Chitnis, P.J. Wiita.	*MNRAS, 510, 3641*
2021	**Temporal and spectral study of PKS B1222+ 216 flares in 2014**. A. Chatterjee, A. Roy, A. Sarkar, V.R. Chitnis.	*MNRAS, 508, 1986*
2021	**SiPM Based Imaging Camera for 4m Class Telescope**. V.R. Chitnis, S.S. Upadhya, K.S. Gothe, S. Duhan, S.K. Rao, B.B. Singh, M. Ranjan, N.K. Parmar, A. Chatterjee, R.L. Deshmukh, P. Dorjey, N. Dorji, A.P.K. Kutty, B.K. Nagesh, V.A. Nikam, S.R. Patel, A. Roy, M.N. Saraf, A. Sarkar, P. Verma, K.K. Yadav, N. Chouhan, V.K. Dhar, P. Chandrab, K. Venugopal.	*37th ICRC Proceedings*
2021	**Multiwavelength Study of Quiescent States of Brightest Blazars detected by Fermi -LAT**. A. Roy, S.R. Patel, A. Sarkar, A. Chatterjee, V.R. Chitnis.	*MNRAS, 504, 1103*
2021	**Multiwaveband Quasi-periodic Oscillation in the Blazar 3C 454.3**. A. Sarkar, A.C. Gupta, V.R. Chitnis, P.J. Wiita.	*MNRAS, 501, 50*
2020	**Multi-waveband quasi-periodic oscillations in the light curves of blazar CTA 102 during its 2016-2017 optical outburst**. A. Sarkar, P. Kushwaha, A.C. Gupta, V.R. Chitnis, P.J. Wiita.	*A&A, 642, 129*
2020	**A possible γ-ray quasi-periodic oscillation of $\sim$ 314 days in the blazar OJ 287** . P. Kushwaha, A. Sarkar, A.C. Gupta, A. Tripathi, P.J. Wiita.	*MNRAS 499, 653*
2019	**Long-term Variability and Correlation Study of the Blazar 3C 454.3 in the Radio, NIR, and Optical Wavebands**. A. Sarkar, V.R. Chitnis, A.C. Gupta, H. Gaur, S.R. Patel, P.J. Wiita, A.E. Volvach, M. Tornikoski, W. Chamani, S. Enestam, A. Lähteenmäki, J. Tammi, R.J.C Vera and L.N. Volvach.	*ApJ 887, 185*