



HIMALAYA SENAPATI
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WORK

AVP, HSBC	Aug 2023 – Present
Visiting Faculty, CMI	Jan 2025 – Apr 2025
Associate, Goldman Sachs	May 2021 – Aug 2023
Visiting Scientist, ISI Bangalore	Mar 2021
Postdoc, IIT Madras	Feb 2021 – Apr 2021
Postdoc, CMI	Aug 2020 – Jan 2021

EDUCATION

PhD in Physics, CMI	Aug 2015 – July 2020
M.Sc. in Physics, CMI	Aug 2013 – July 2015
B.Sc. in Physics, CMI	Aug 2010 – July 2013

SELECTED PUBLICATIONS

Quantum three-rotor problem in the identity representation, G. S. Krishnaswami and H. Senapati, Phys. Rev. E, 111 (1), 014221 (2025).
Ergodicity, mixing and recurrence in the three rotor problem, G. S. Krishnaswami and H. Senapati, Chaos, 30 (4), 043112 (2020). [Editor's pick].
Classical three rotor problem: periodic solutions, stability and chaos, G. S. Krishnaswami and H. Senapati, Chaos, 29 (12), 123121 (2019). [Editor's pick, Featured article].
Curvature and geodesic instabilities in a geometrical approach to the planar three-body problem, G. S. Krishnaswami and H. Senapati, J. Math. Phys., 57, 102901 (2016). [Featured Article].

HONORS AND AWARDS

Best Poster Presentation Award , Conference on Nonlinear Systems and Dynamics, IIT Kanpur	2019
Oberwolfach Leibniz Graduate Students Grant , Awarded by MFO, Germany	2018
International Travel Support Grant , Awarded by SERB, India	2017
Indian National Mathematics Olympiad , Selected among top 30 students countrywide	2007,'08,'09,'10
Indian National Astronomy Olympiad , Selected among top 30 students countrywide	2007,'08,'09,'10
Zonal Informatics Olympiad , Selected among top 229 students countrywide	2009
KVPY Fellowship , Awarded to 200 students by Dept. of Science & Technology, Govt. of India	2008–2013
National Child Award for Exceptional Achievement , Awarded by Department of Women & Child Development, Govt. of India	2008
XII International Astronomy Olympiad , Silver Medal	2007

SCHOOLS & CONFERENCES

Statistical Physics of Machine Learning, Jan 6-10, 2020 (ICTS, Bengaluru)
Conference on Nonlinear Systems and Dynamics, Dec 12 - 15, 2019 (IIT Kanpur).
CIMPA school on Finsler geometry and applications, Dec 5 - 12, 2019 (BHU, Varanasi).
Workshop on Data Analysis and Machine Learning, May 24-28, 2019 (IISER Tirupati).
Workshop on Topological Dynamics, Number Theory and related areas, Jan 04 - 13, 2019 (RKMVERI, Belur Math).
Populations: Interactions and Evolution, Sep 10-14, 2018 (Institut Henri Poincaré, Paris).
Recent trends in Teichmüller theory and Mapping class groups, Sep 2-8, 2018 (MFO, Oberwolfach).

SERB School on Nonlinear dynamics, January 02 - 29, 2018 (SPPU, Pune).

Geometry, Groups and Dynamics, November 06 - 24, 2017 (ICTS, Bengaluru).

Probabilistic and statistical methods for networks, Aug 21 - Sep 1, 2017 (BMS Summer School, Berlin).

INDUSTRY EXPERIENCE

Analyzing dispersion trades with a focus on managing risk (Aug 2023 - present, HSBC).

- Developed a framework to simulate dispersion trades with specified market params such as correlation and volatility surface.
- Investigated first and second order greeks and impact on PnL explain.

Porting pricing logics from Slang to C++ along with associated debugging and backtesting (May 2021 - Aug 2023, Goldman Sachs).

- Developed parts of the C++ pricing engine for USD vanilla swaps to be called from a Java stack.
- Backtested the flow against existing Slang stack and resolved diffs for correct pricing.
- Developed and implemented curve fitting algorithms in C++ for faster and accurate pricing.

ACADEMIC PROJECTS

Gaussian Process based understanding of Deep Learning Machines (with David Saad, unfinished): The goal of the project was to design scalable and interpretable machine learning methods via Deep Gaussian Processes. This would have had application in high-risk areas such as Health and Finance.

Instabilities, chaos and ergodicity in the three-rotor problem: Analytical methods along with numerical tools and statistical measures were used to investigate dynamics of a model of coupled Josephson junctions. *Publications* –

- *Ergodicity, mixing and recurrence in the three rotor problem*, G. S. Krishnaswami and H. Senapati, *Chaos*, 30 (4), 043112 (2020). [Editor's pick].
- *Stability and chaos in the classical three rotor problem*, G. S. Krishnaswami and H. Senapati, *Indian Academy of Sciences Conference Series*, 2(1), 139-143 (2019).
- *Classical three rotor problem: periodic solutions, stability and chaos*, G. S. Krishnaswami and H. Senapati, *Chaos*, 29 (12), 123121 (2019). [Editor's pick, Featured article].

Geometric approach to the planar three-body problem: Techniques from Riemannian Geometry and variational principle were used to analyze instabilities in a Sun-Earth-Moon type problem. *Publications* –

- *An introduction to the classical three-body problem: From periodic solutions to instabilities and chaos*, G. S. Krishnaswami and H. Senapati, *Resonance*, 24, 87-114 (2019).
- *Curvature and geodesic instabilities in a geometrical approach to the planar three-body problem*, G. S. Krishnaswami and H. Senapati, *J. Math. Phys.*, 57, 102901 (2016). [Featured Article].

Non-Euclidean geometry: Inequalities and monotonicity properties in spherical and hyperbolic geometries. *Publications* – Three chapters in "Eighteen Essays in Non-Euclidean Geometry", Eds. V. Alberge and A. Papadopoulos, European Mathematical Society Publishing House, Zurich (2019):

- *On a theorem of Lambert: Medians in spherical and hyperbolic geometries*, H. Senapati, pp. 57-65.
- *Inscribing a triangle in a circle in spherical geometry*, H. Senapati, pp. 67-79.
- *Monotonicity in spherical and hyperbolic triangles*, H. Senapati, pp. 81-91.

OTHERS

Created a network of about hundred researchers in complex systems and ran a biweekly seminar series from October 2020 to April 2021.

Participated as an organizational member of the Academic team in the 10th International Olympiad on Astronomy and Astrophysics, Bhubaneswar, December 2016.

Taught at winter camps for children selected in Rural Mathematics Talent Search, Odisha, 2010,'11,'12.