

PROFESSIONAL INFORMATION	Research Professor A, CUICBAS – Facultad de Ciencias Universidad de Colima Bernal Díaz del Castillo No. 340 Colima, Colima, Mexico	Emails: [sujoysnb@gmail.com] [smodak@ucol.mx] Tel: +52-321-241 2051
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Honorary:
Adjunct Assistant Professor,
Physics Department
California State University, Fresno;
2345 E San Ramon Ave Hall 158, Fresno, CA 93710

PERSONAL Birth date - June 12, 1984; Place - India; Nationality - Indian; Permanent Resident - Mexico; Marital Status - Married; Children - 1 (daughter)

BROAD RESEARCH AREA Gravitation and Quantum Theory

RESEARCH INTERESTS Field theory in curved spacetime, black Holes, spacetime thermodynamics, quantum foundation, quantum gravity phenomenology

EDUCATION **Ph.D., Physics (Theory),** *Awarded:* August 2012

S. N. Bose National Centre, University of Calcutta, Kolkata, WB, India.

- Thesis Title: *Thermodynamics of Black Holes: Semi-classical Approaches and Beyond*
- Advisor: Rabin Banerjee, Senior Professor

M.Sc., Physics, 2007

University of North Bengal, Darjeeling, WB

- *First Class*
- Project Topic: *Fractional Brownian Motion*
- Advisor: Amitabha Mukhopadhyay, Professor.

B.Sc., Physics, 2005

University of North Bengal, Darjeeling, WB

- *First Class*
- College Rank 1; All University Rank 6

PRESENT POSITION Equivalent of **Assistant Professor, tenure-track** November 2016 onwards

PAST RESEARCH Postdoctoral Experience : 4 Years & 4 Months

JSPS Fellow September 2015 to October 2016

Institute of Particle and Nuclear Studies,
KEK Theory Center ,
High Energy Accelerator Research Organization (KEK), Japan
Host: Izumi Tsutsui, Associate Professor

Postdoctoral Fellow September 2013 to September 2015

Instituto de Ciencias Nucleares,
Universidad Nacional Autónoma de México, México
Host: Daniel Sudarsky, Researcher C

Postdoctoral Fellow June 2012 to September 2013

IUCAA, Pune, India
Host: Thanu Padmanabhan, Distinguished Professor

Visiting Researcher Oct 2011 to Dec 2011

Department of Physics
California State University at Fresno, CA, USA
Host: Douglas Singleton, Professor

TEACHING Teaching experience (undergraduate physics): 3 Years.

Courses taught in University of Colima:

Introductory Physics 2 [Spril 2019]; Electricity and Magnetism I [Fall 2018, Fall 2019]; Quantum Mechanics I & II [Fall 2017, Spring 2018]; Astrophysics [Fall 2017]; Statistical Mechanics [Spring 2017, 2019].

Other courses: QFT in Curved Space, Theory Center, [March - May, 2016]; KEK High Energy Accelerator Organisation, Japan: .

Teaching Evaluation: Average approval rate by students on all courses taught = 87.87 %

STUDENT SUPERVISION

Undergraduate

- Carlos Villalpando, “Probing quantum gravity’s minimal length with molecular wavepackets,” Bachelor Thesis, University of Colima, Mexico [Defended : June, 2019]. (*Carlos got Best Presentation Award for Undergraduate Research in APS March Meeting, 2019*)
- Enrique Ruiz, “Linearized Gravity” Bachelor Thesis, University of Colima, [Under Progress].

Postgraduate

- Erick Eiken, “Modified commutation relationship from the Berry-Keating Program,” Master Thesis, (Co-Supervisor: D. Singleton), California State University, Fresno, USA, 2019 [Defended: May, 2019].

RESEARCH GRANTS

- National Science Agency (CONACyT) Grant, FY 2019-2022
Equivalent of USD 25000
 - Secretary of Public Education Start-Up Grant, México FY 2017-2018
Equivalent of USD 15000.
 - KAKENHI Grant in Aid, Equivalent of USD 15000, FY 2015-2017
Japan Society for Promotion of Science.
 - American Physical Society’s International Travel Grant, 2012
USD 2000
 - American Physical Society’s IUSSTF Indo-US Travel Grant, 2011
USD 3000
- Sum of all research grants = USD 60,000.00

FELLOWSHIPS

- Japan Society for Promotion of Sciences (JSPS) 2015
Postdoctoral Fellowship for Overseas Researchers
- Postdoctoral Research Fellowship by Universidad 2013
Nacional Autónoma de México (UNAM),
México City, México.
- Postdoctoral Research Fellowship by 2012
Inter University Centre for Astronomy and
Astrophysics, Pune, India
- Selected for Centenary 2012
Post-doctoral Fellowship, Indian Institute
of Science (did not join)
- CSIR Junior and Senior Research Fellowship, 2007-2012
Govt. of India

PUBLICATIONS

Book

32. **Sujoy K. Modak**, Thermodynamics of black holes: semi-classical approaches and beyond, 1st Edition, 2019, Publisher: Lambert Academic Publishing, Germany, ISBN: 978-6139472192.

Book Chapter

31. **S. K. Modak**, D. Sudarsky, “Modelling Non-paradoxical Loss of Information in Black Hole Evaporation,” in Gravity and the Quantum, edited by Jasjeet Singh Bagla and Sunu Engineer, Fundamental Theories of Physics Series, Vol. 187, Springer 2017.

Review Article

30. **S. K. Modak**, “Cosmological particle creation beyond de Sitter,” *International Journal of Modern Physics D* 28, no.09, 1930015 (2019).

Refereed Journal Publications

29. C. Villalpando and **S. K. Modak**, “Probing Quantum Gravity with Large Molecular Wave-packets,” *Classical and Quantum Gravity*, 2019, *Accepted*, [arXiv:1901.09696 [gr-qc]].
28. C. Villalpando and **S. K. Modak**, “Minimal length effect on the broadening of free wave-packets and its physical implications,” *Physical Review D*, 024054 (2019), [arXiv:1812.06112 [gr-qc]].
27. **S. K. Modak**, “New geometric and field theoretic aspects of a radiation dominated universe II. Fundamental Cosmological Observers (FCOs),” *Submitted*, [arXiv:1806.00972 [gr-qc]].
26. **S. K. Modak**, “Does gravity cause disentanglement?,” *Submitted*, [arXiv:1803.10503 [gr-qc]].
25. **S. K. Modak**, “New geometric and field theoretic aspects of the radiation dominated universe,” *Physical Review D*, 97, 10501(2018), [arXiv:1802.03833 [gr-qc]].
24. **S. K. Modak**, D. Sudarsky, “Collapse of the wavefunction, the information paradox and backreaction,” *European Physical Journal C* 78 (2018) no.7, 556, [arXiv:1711.01509 [gr-qc]].
23. D. J. Bedingham, **S. K. Modak** and D. Sudarsky, “Relativistic collapse dynamics and black hole information loss”, *Physical Review D* **94**, no.4, 045009 (2016) [arXiv:1604.06537 [gr-qc]].
22. **S. K. Modak**, L. Ortíz, I. Peña and D. Sudarsky, “Black Hole Evaporation: Information Loss but No Paradox,” *General Relativity and Gravitation* **47**, no.10, 120 (2015) [arXiv:1406.4898 [gr-qc]].
21. **S. K. Modak**, L. Ortíz, I. Peña and D. Sudarsky, “Non-Paradoxical Loss of Information in Black Hole Evaporation in a Quantum Collapse Model,” *Physical Review D* **91**, no. 12, 124009 (2015), [arxiv:1408.3062 [gr-qc]].
20. **S. K. Modak** and D. Singleton, “Baryogenesis via Hawking-like radiation in the FRW spacetime,” *European Physical Journal*, **C 75**, 200 (2015), [arXiv:1410.6785 [gr-qc]].
19. **S. K. Modak**, “Backreaction due to quantum tunneling and modification to black hole evaporation process,” *Physical Review D* **90**, 044015 (2014), [arXiv:1407.5971 [gr-qc]].
18. **S. K. Modak** and D. Singleton, “Reply to ‘Comment on Inflation with a graceful exit and entrance driven by Hawking radiation’,” *Physical Review D* 89, 068302 (2014) [arXiv:1403.1792].

17. A. Dutta and **S. K. Modak**, “Holographic entanglement entropy in imbalanced superconductors,” *Journal of High Energy Physics*, 1401, 136 (2014), [arXiv: 1305.6740 [hep-th]].
16. S. Singh, **S. K. Modak** and T Padmanabhan, “Evolution of quantum field, particle content, and classicality in the three stage universe,” *Physical Review D* 88, 125020 (2013), [arXiv: 1308.4976 [hep-th]].
15. **S. K. Modak**, D. Singleton, “Inflation with a graceful exit and entrance driven by Hawking radiation”, *Physical Review D* 86, 123515 (2012), [arXiv: 1207.0230].
14. **S.K. Modak**, D. Singleton, “Hawking radiation as a mechanism for inflation,” *International Journal of Modern Physics D* 21, 1242020 (2012), [arXiv: 1205.3404]. *Awarded Honorable Mention in Gravity Research Foundation Essay Contest, 2012.*
13. R. Banerjee, **S. K. Modak**, D. Roychowdhury, “A unified picture of phase transition: from liquid-vapour systems to AdS black holes,” *Journal of High Energy Physics* 1210, 125 (2012), [arXiv: 1106.3877]. **Citations = 50+**
12. **S. K. Modak** and S. Samanta, “Effective values of Komar Conserved Quantities and Their Applications,” *International Journal of Theoretical Physics* 51, 1416 (2012), [arXiv:1006.3445 [gr-qc]].
11. R. Banerjee, **S. K. Modak** and S. Samanta, “Second Order Phase Transition and Thermodynamic Geometry in Kerr-AdS Black Hole,” *Physical Review D* 84, 064024 (2011), [arXiv:1005.4832 [hep-th]]. **Citations = 50+**
10. R. Banerjee, B. R. Majhi, **S. K. Modak** and S. Samanta, “Killing Symmetries and Smarr Formula for Black Holes in Arbitrary Dimensions,” *Physical Review D* 82, 124002 (2010), [arXiv:1007.5204 [gr-qc]].
9. R. Banerjee, **S. K. Modak** and S. Samanta, “Glassy Phase Transition and Stability in Black Holes,” *European Physical Journal C* 70, 317 (2010), [arXiv:1002.0466 [hep-th]]. **Citations = 49**
8. R. Banerjee, S. Gangopadhyay and **S. K. Modak**, “Voros product, Noncommutative Schwarzschild Black Hole and Corrected Area Law,” *Physics Letters B* 686, 181 (2010), [arXiv:0911.2123 [hep-th]]. **Citations = 100+**
7. R. Banerjee and **S. K. Modak**, “Quantum Tunneling, Blackbody Spectrum and Non-Logarithmic Entropy Correction for Lovelock Black Holes,” *Journal of High Energy Physics* 0911, 073 (2009), [arXiv:0908.2346 [hep-th]]. **Citations = 50+**
6. R. Banerjee and **S. K. Modak**, “Exact Differential and Corrected Area Law for Stationary Black Holes in Tunneling Method,” *Journal of High Energy Physics* 0905, 063 (2009), [arXiv:0903.3321 [hep-th]]. **Citations = 100+**

5. **S. K. Modak**, “Corrected entropy of BTZ black hole in tunneling approach,” Physics Letters B 671, 167 (2009), [arXiv:0807.0959 [hep-th]]. Citations = 100+
4. S. Ghosh and **S. K. Modak**, “Classical oscillator with position-dependent mass in a complex domain,” Physics Letters A 373, 1212 (2009), [arXiv:0803.2531 [math-ph]].
3. R. Banerjee, B. R. Majhi and **S. K. Modak**, “Noncommutative Schwarzschild Black Hole and Area Law,” Classical and Quantum Gravity 26, 085010 (2009), [arXiv:0802.2176 [hep-th]]. Citations = 50+

Refereed Conference Proceedings

2. **S. K. Modak**, “Generalized Smarr formula as a local identity for arbitrary dimensional black holes,” Jour. of Physics: Conference Series, 405, 012023 (2012), [arXiv:1210.0722], International Conference on Modern Perspectives of Cosmology and Gravitation (COSGRAV 12), Feb 7-11 2012, Kolkata, India.
1. **S.K. Modak**, D. Singleton, “Hawking radiation as a mechanism for inflation,” AIP Conference Proceedings 1514, 150-153 (2012), Multiverse and Fundamental Cosmology (Multicosmofun’12), Sep 10-14, 2012, Szczecin, Poland.

Papers in Preparation

- **S. K. Modak**, I. Tsutsui, “Vacuum awakening in relativistic stars via dynamical state reduction”.
- **S. K. Modak**, T. Padmanabhan, “Quantum fields in inflationary universe transiting into radiation stage”.
- **S. K. Modak**, “Re-coherence and the need for collapse to form primordial inhomogeneities after inflation.”

CITATIONS AND Citations

IMPACT FACTORS • Total citations (without proceedings and books) = 849

OF PAPERS • No of research article (without proceedings) = 29

• Average citation per Paper = 29

• No of papers 50 or more citations = 4

• No of papers with 100 or more citations = 3

• h-index = 14

Impact Factor (without 2 Conf. Proc.)

• Total Impact Factor = 100+

• Average Impact Factor per Paper = 4.5

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- AWARDS,
HONORS
- JSPS Fellow, Japan 2015
 - Member “Level I,” CONACyT, México, 2015 onwards
 - Honorable Mention Award in Gravity Research Foundation Essay Competition, USA. 2012
 - National Eligibility Test (NET) for Lectureship, and JRF Award, Govt. of India. 2007

- SELECTED
PRESENTATIONS
(LAST 5 YEARS)
- “Saying yes to loss of information in black hole evaporation,” PCGM 34, Caltech, Pasadena, March 2018, USA.
 - “New geometric and field theoretic aspect of the radiation dominated universe,” California State University, Fresno, USA, March 2018.
 - “Revisiting the quantum origin of the seeds of cosmic structure formation,” Invited talk at the conference Quantum Universe, International Center for Fundamental Research, BUAP, June 2017, Puebla, Mexico.
 - “Black holes: information loss but no paradox,” Invited talk at Annual Particle Physics meeting of Mexican Physical Society, CINVESTAV, May 2017, Mexico City.
 - “Black hole information paradox in light of foundation of quantum mechanics,” Universidad de Colima, November 2016, Mexico.
 - “Reconciling quantum dynamics with information loss inside black holes,” Nihon University, May 2016, Japan.
 - “Black hole information loss: a route to new physics,” October 2015, talk presented at the Theory Center of High Energy Accelerator Research Organization (KEK), Japan.
 - “Resolving black hole information paradox using quantum collapse model,” November 2014, poster presented in “South American Workshop for Foundation of Quantum Theory and Cosmology,” ICTP-SAIFR, Sao Paulo, Brazil.

PROFESSIONAL
SERVICE AND
SCIENCE
OUTREACH
(LAST 5 YEARS)

Referee of

- **Nature Communications, Springer.**
- Physical Review D, American Physical Society.
- Physics Letters B, Elsevier.
- European Physical Journal C, Springer.
- General Relativity and Gravitation, Springer.
- Annals of Physics, Elsevier.
- Advances in High Energy Physics, Hindawi.
- Entropy, MDPI.
- International Journal of Modern Physics A, Worldscientific.
- Science Outreach: Science lecture in a Japanese High School [Akita Prefectural Yokote Seiryu Gakuin High School (Yokote-city, Akita)] under the “Science Dialogue” Program of the Japan Society for Promotion of Sciences, Feb 2016.
- Science popularization talks for high school students in Colima.

- International Reviewer for Grant Proposal, Czech Science Foundation, 2017.

MEMBERSHIPS

- Member, American Physical Society, USA (2010-2012).
- Member, Indian Association of General Relativity and Gravitation (IAGRG), India (Lifetime).
- Member, Level 1, National System of Researchers, CONACYT, Mexico (Jan 2015 onwards).

LIST OF
ACADEMIC
REFEREES

- 5) Satoshi Iso, (+81)-29-879-6093
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- 4) Daniel Sudarsky, (+52)-55-5622 4690
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Instituto de Ciencias Nucleares,
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CP 04510, México DF, México.
- 3) Douglas Singleton, (+1)-559-278-2523
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California State University at Fresno
Fresno, CA 93740-8031, USA.
- 2) Rabin Banerjee, (+91)-33-2335-5706
Senior Professor, rabin@bose.res.in
S. N. Bose National Centre for Basic Sciences,
Block JD, Sector 3, Salt Lake,
Kolkata 700098, India
- 1) Thanu Padmanabhan, (+91)-20-2560-4106
Scientist I (Distinguished Professor), nabhan@iucaa.in
Inter-University Centre for Astronomy
and Astrophysics (IUCAA)
Post Bag 4, Ganeshkhind, Pune - 411 007, India.