

SHREYASHI CHAKDAR

Assistant Professor, Department of Physics

College of the Holy Cross, MA

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1 ACADEMIC TRACK RECORD

- ◇ **Assistant Professor of Physics** 2019-Current
Department of Physics,
College of the Holy Cross, MA
- ◇ **KITP Scholar** 2019-2021
*Kavli Institute for Theoretical Physics,
University of California, Santa Barbara*
- ◇ **Visiting Assistant Professor** 2017-2019
Department of Physics and Astronomy,
Colby College, ME
- ◇ **Postdoctoral Research Associate** 2015-2017
Department of Physics, University of Virginia
- ◇ **Graduate Fellow** Fall 2014
*Kavli Institute for Theoretical Physics,
University of California, Santa Barbara*
- ◇ **Ph.D. in Physics** 2009-2015
*Oklahoma State University, (Advisor Dr. S. Nandi)
Dissertation Title: New Physics at the TeV Scale*
- ◇ **M.Sc. Physics** 2006-2008
Indian Institute of Technology- Roorkee, India
- ◇ **B.Sc. (Honors) Physics** 2003-2006
University of Calcutta, Lady Brabourne College, India

2 TEACHING EXPERIENCE

- ◇ **Assistant Professor (Tenure Track)** '19-current
Department of Physics, College of the Holy Cross

Currently teaching Introductory and advanced physics courses across the UG curriculum (Introductory Physics I (Mechanics), Introductory Physics II (Electricity & Magnetism), Topics in Physics course, Quantum Mechanics) along with establishing and leading theoretical physics research lab focusing on particle physics research topics including Higgs, neutrino and dark matter. Mentoring responsibilities include founding and leading the "Women in Physics" group, Physics department, Holy Cross.

- ◇ **Visiting Assistant Professor** '17-'19
Department of Physics and Astronomy, Colby College

Taught several introductory physics courses (How Things Work, Foundations of Mechanics, Electricity and Magnetism) and advanced courses (Classical Mechanics, Quantum Mechanics) along with supervising general physics laboratories along with performing research with undergraduate physics majors for completion of senior thesis along with mentoring responsibilities.

◇ **Lecturer**
University of Virginia, Department of Physics

2016

Taught an introductory physics course Phys 1050 ('How Things Work') for non-physics majors. The course concentrates on practical introduction to physics and science in everyday life. This widely popular course conceived and taught in University of Virginia has developed a lot of interest nationwide over time. I complemented this course using active learning techniques using demonstrations, case-studies, think aloud pair problem solving (TAPPS) and an audio-visual final project (Scavenger Hunt).

◇ **Graduate Teaching Assistant, Recitation** Sp '10, Fa '10, Sp '11, Fa '11, Sp '12, Fa '12, Sp '13, Fa '13, Sp '14
Oklahoma State University, Department of Physics

Conducted recitation sessions for the calculus-based introductory physics course for science, math and engineering majors covering **electromagnetism and optics**. Reviewed course material, homework questions, demonstrated problem solving tactics during recitation and supplemental discussion sessions, conducted and graded quizzes and tests.

◇ **Graduate Teaching Assistant, Laboratory** 2010
Oklahoma State University, Department of Physics

Conducted the hands-on experience of Laboratory Course for calculus-based introductory physics course for science, math and engineering majors in Classical Mechanics. I monitored students' lab experiments, graded lab assignments, conducted and graded the final lab test.

3 RESEARCH EXPERIENCE

◇ **Advisor for Undergraduate research in Theoretical Physics, College of the Holy Cross** 2019

Established the Theoretical Physics research lab with emphasis on the Beyond Standard Model (BSM) model building and associated phenomenology at the Large Hadron Collider (LHC). Some topics of summer research program include neutrino and dark matter model building and Higgs (scalar sector) analysis and Collider phenomenology at the LHC.

◇ **KITP Scholar, Kavli Institute for Theoretical Physics, University of California, Santa Barbara** 2019-2021

Chosen as a KITP Scholar during the 2019-2021 sessions to conduct research projects, join conferences and programs and build research collaborations in KITP for the award period.

◇ **Advisor for Undergraduate research in Particle Physics, Colby College** 2017-2019

Worked on beyond the Standard Model (BSM) model building and associated phenomenology at the Large Hadron Collider (LHC) with Physics and Astronomy majors (advised students with senior research project and independent research).

◇ **Pirrung Postdoctoral Fellow, Physics Department, University of Virginia** 2015-2017

Worked on 'Electro-weak scale right handed neutrino' model building and collider phenomenology with emphasis on the final states of jets and di-lepton and missing energy signals with characteristic displaced vertices at the 13 TeV Large Hadron Collider (LHC) arising from the production and decays of the 'mirror quarks and leptons' in the model.

◇ **Graduate Fellow, Kavli Institute for Theoretical Physics, Univ of California, Santa Barbara** Fall 2014

Working on Warm Dark Matter in Two Higgs Doublet Models, we showed that a neutral scalar field incorporating the seesaw mechanism for neutrino masses can be identified as a consistent warm KeV scale dark matter candidate.

◇ **PhD Dissertation, Theoretical Particle Physics, Oklahoma State University** 2009-2015

Worked on beyond the Standard Model (BSM) models with some specific topics such as low scale unification, neutrino mass models, two higgs doublet models, baryon and lepton number violation, leptoquarks, left right symmetric models, supersymmetry, dark matter, higgs physics, charge quantization, CP Violation etc.

◇ **Masters with Nuclear physics major, Indian Institute of Technology, Roorkee, India** 2006-2008

Studied gamma ray spectroscopy using clover array detector Indian National Gamma Array (INGA) with assembly of detectors, data-collection from INGA-2008 and data-analyzing using CANDLER and RADWARE software.

◇ **Graduate Summer Research in Cosmology, Inter University Center for Astronomy and Astrophysics (IUCAA), Pune, India** Summer 2007

Worked under the supervision of Prof. J. V. Narlikar on Credibility of Cosmological models from Supernovae gold data observations. I studied models of the universe with different deceleration parameters using HST data of 41 Supernovae gold sample.

4 RESEARCH INTERESTS

Theoretical Particle Physics

- ◇ Collider Physics
- ◇ Model building and phenomenological aspects of Beyond Standard Model (BSM) Physics
- ◇ Neutrinos and Cosmology
- ◇ Astroparticle Physics and Effective field theories

5 PUBLICATIONS

1. **Prospect and phenomenology of a singlet light Dark matter candidate in the EW-scale RH neutrino model**, Shreyashi Chakdar, D. Ghosh, P.Q Hung, Najimuddin Khan, *in preparation*
2. **A symmetric Two Higgs doublet model**, H. Bossi, Shreyashi Chakdar, arXiv: 1810.13408 [hep-ph]
3. **The search for electroweak-scale RH neutrinos and mirror charged leptons through like-sign dilepton signals**. Shreyashi Chakdar, K. Ghosh, V. Hoang, P.Q Huang and S. Nandi, Phys.Rev. D95 (2017) no.1, 015014, arXiv: 1606.08502 [hep-ph]
4. **The search for mirror quarks at the LHC**. Shreyashi Chakdar, K. Ghosh, V. Hoang, P. Q Hung and S. Nandi, Phys. Rev. D 93, 035007 (2016), arXiv:1508.07318
5. **Superworld without Supersymmetry**. Shreyashi Chakdar, K. Ghosh, S. Nandi, Phys. Lett. B754 (2016) 162-166, arXiv:1508.00885 [hep-ph].
6. **Dark Matter, Parallel Universe and Multiple Higgs Signals at the ILC**. Shreyashi Chakdar, K. Ghosh, S. Nandi, arXiv:1410.7331 [hep-ph] (2015), Submitted to J. Phys. G.
7. **A model for Dirac neutrino mass matrix with only four parameters**. Shreyashi Chakdar, K. Ghosh, S. Nandi, arXiv:1405.2328 [hep-ph] (2015), Submitted to JHEP.
8. **Warm Dark matter in Two Higgs Doublet Models**.

K.S. Babu, Shreyashi Chakdar, R.N Mohapatra, Phys. Rev. D91 (2015) 7, 075020, arXiv:1412.7745 [hep-ph].

9. A predictive model of Dirac Neutrinos.

Shreyashi Chakdar, K. Ghosh, S. Nandi, Physics Letters B 734C (2014), pp. 64-67, arXiv:1403.1544 [hep-ph]

10. Parallel universe, dark matter and invisible Higgs decay.

Shreyashi Chakdar, K. Ghosh, S. Nandi, Phys. Lett. B732 (2014) 343-348, arXiv:1311.2543 [hep-ph]

11. Non-universal SUGRA at LHC: Prospects and Discovery Potential.

S. Bhattacharya, Shreyashi Chakdar, K. Ghosh, S. Nandi, Phys. Rev. D89 (2014) 015004, arXiv:1309.0036 [hep-ph]

12. Collider signatures of mirror fermions in the framework of Left Right Mirror Model.

Shreyashi Chakdar, K. Ghosh, S. Nandi, Santosh Kumar Rai, Phys. Rev. D88, 095005(2013), arXiv:1305.2641 [hep-ph].

13. Top SU(5) Models: Baryon and Lepton Number Violating Resonances at the LHC.

Shreyashi Chakdar, Tianjun Li, S. Nandi, Santosh Kumar Rai, Phys. Rev. D87 (2013) 096002, arXiv:1302.6942 [hep-ph].

14. Unity of elementary particles and forces for the third family.

Shreyashi Chakdar, Tianjun Li, S. Nandi, Santosh K. Rai, Phys. Lett. B 718 (2012) 121-124, arXiv:1206.0409 [hep-ph].

6 PRESENTATIONS, CONFERENCES AND SEMINARS

6.1 INVITED TALKS

- ◇ 'PHENO 2020', University of Pittsburgh May, 2020
"Analysis of the scalar sector & prospect of a scalar dark matter candidate in EW ν R model"
- ◇ 'NDM 2020', Center for Fundamental Physics, Hurgada, Egypt January, 2020
"Distinguished LHC signatures of EW Scale RH neutrinos in lifetime frontier"
- ◇ 'PHENO 2019', University of Pittsburgh May, 2019
"Unraveling New Physics at the Lifetime Frontier"
- ◇ 'PHENO 2018', University of Pittsburgh May, 2018
"A Symmetric Two Higgs Doublet Model"
- ◇ 'PHENO 2017', University of Pittsburgh May, 2017
"Search for EW-Scale RH Neutrinos and mirror changed leptons"
- ◇ 'PASCOS 2016', ICISE, Quy Nhon, Vietnam July, 2016
"Distinguished LHC signatures of EW scale RH Fertile neutrinos"
- ◇ 'PHENO 2016', University of Pittsburgh May, 2016
"Distinguished LHC signatures of EW scale RH Fertile neutrinos"
- ◇ 'PHENO 2015', University of Pittsburgh May, 2015
"Dark Matter explained through two distinct ideas related to Higgs"
- ◇ 'Oklahoma State University', Stillwater November, 2014
"Predictive Models of Dirac Neutrinos."
- ◇ 'Present and Future Neutrino Physics', KITP, UC Santa Barbara October, 2014
"Predictive Models of Dirac Neutrinos."
- ◇ 'PHENO 2014', University of Pittsburgh May, 2014
"Predictive Models of Dirac Neutrinos."
- ◇ 'PHENO 2013', University of Pittsburgh May, 2013
"Top SU(5) Models: Baryon and Lepton Number Violating Resonances at the LHC."
- ◇ 'TASI 2013', University of Colorado, Boulder June, 2013
"Left-Right Mirror Model at LHC."

6.2 SEMINARS AND COLLOQUIUMS

- ◇ 'Physics Colloquium', Clark University, MA Nov, 2019

- ◇ "Frontiers of New Physics at the Large Hadron Collider." Oct, 2019
- ◇ **'Physics Colloquium', Wesleyan University, MA**
- ◇ "Frontiers of New Physics at the TeV Scale" April, 2019
- ◇ **'Physics Seminar', Bowdoin College, ME**
- ◇ "Beyond the Standard Model Physics at the LHC" Nov, 2016
- ◇ **'Center for Neutrino Physics Seminar', Virginia Tech**
- ◇ "Searching for See-Saw signatures at the Large Hadron Collider." April, 2016
- ◇ **'Physics Seminar', College of William and Mary**
- ◇ "The Search for Mirror quarks & leptons with distinguished signatures at 13TeV LHC." March, 2016
- ◇ **'HEP Seminar', Oklahoma State University /University of Oklahoma**
- ◇ "The Search for Mirror quarks with distinguished signatures at the 13TeV LHC." January, 2014
- ◇ **'High Energy Seminar', Ohio State University**
- ◇ "New Physics at the LHC." Dec, 2013
- ◇ **'Physics Seminar', University of Calcutta, India**
- ◇ "New Physics at the LHC." Dec, 2013
- ◇ **'Particle Physics Seminar', Indian Association for the Cultivation of Science**
- ◇ "New Physics at the LHC." Nov, 2013
- ◇ **'Particle Physics Seminar', University of California, Irvine**
- ◇ "New Physics at the LHC." Nov, 2013
- ◇ **'Special Seminar', University of California, Riverside**
- ◇ "New Physics at the LHC."

6.3 CONFERENCES ATTENDED

- ◇ **'Large Hadron Collider Physics (LHCP) Conference 2020'**, Paris/online May, 2020
- ◇ **'APS April Meeting 2020'**, Washington DC/online Apr, 2020
- ◇ **'Collider, Dark Matter and Neutrino Physics Workshop 2018'**, Texas A&M May, 2018
- ◇ **'2018 DCPIHEP Workshop'**, Dual CP Institute of High Energy Physics, Colima, MX Jan, 2018
- ◇ **'AAPT Workshop'**, Workshop for New physics and Astronomy faculty Nov, 2017
- ◇ **'DPF17'**, Meeting of the APS Division of Particles and Fields July, 2017
- ◇ **'Neutrinos: Recent Developments and Future Challenges'**, KITP Nov, 2014
- ◇ **'PiTP 2013'**, Prospects in Theoretical Physics, 'LHC Physics', IAS, Princeton July, 2013
- ◇ **'TASI 2013'**, 'The Higgs Boson and Beyond', University of Colorado, Boulder June 2013
- ◇ **'HCPS 2012'**, 'Hadron Collider Physics Summer School', Fermilab August 2012
- ◇ **'BSMLHC'**, 'Beyond the Standard Model Physics at the LHC', Indian Association for the Cultivation of Science (IACS), Kolkata, India Jan, 2009

6.4 POSTERS

- ◇ **'Neutrino 2020', Fermilab/online** June 2020
- ◇ "Light singlet Scalar Dark Matter prospect in the EW scale righthanded neutrino model"
- ◇ **'The Postdoctoral Research Symposium', University of Virginia** September 2016
- ◇ "The search for 'mirror' quarks with distinguished signatures at the 13 TeV LHC"
- ◇ **'ICHEP 2016', Chicago** August, 2016
- ◇ "The search for 'mirror' quarks with distinguished signatures at the 13 TeV LHC"
- ◇ "Warm Dark Matter in Two Higgs Doublet Models."
- ◇ **'SUSSP69', St. Andrews University, Scotland** August, 2012
- ◇ "Unity of Elementary Particles in the third family."

7 HONORS, AWARDS AND FELLOWSHIPS

- ◇ **Chosen** as a **KITP Scholar** for the years 2019-2021 2019
- ◇ **Chosen to serve** as a Journal Referee of `Physical Review D' 2016
- ◇ **Awarded** the First place and the audience choice award in the Physical Science and Engineering category of The Postdoctoral Research Symposium 2016 at the University of Virginia 2016
- ◇ **Chosen** among 40 young scientists (out of 1500) to present research in the "International Conference in High Energy Physics" 2016, Chicago Plenary session 2016
- ◇ **Awarded** RHA Leader Scholar Award 2015 by Oklahoma State University (OSU) 2015
- ◇ **Awarded** Kent Sampson Award 2015 (Leader Scholar award) by OSU. 2015
- ◇ **Awarded** Dr. Rebecca Adcock Memorial Award 2015 (Leader Scholar award) by OSU. 2015
- ◇ **Awarded** Dr. Paul A. Westhaus Scholarship 2015 by Physics Department, OSU. 2015
- ◇ **Awarded** Outstanding Research Assistant award for Theory 2015 by Physics Department, OSU. 2015
- ◇ **Awarded** Honorary Graduate Commencement Marshal award for OSU Spring Commencement 2015. 2015
- ◇ **Nominated** for Phoenix award, OSU 2015 as an outstanding Doctoral degree student. 2015
- ◇ **Awarded** the PITT PACC Travel award for the Phenomenology 2015 Symposium (Pheno'15). 2015
- ◇ **Awarded** Women's Faculty Council Research Award given by OSU women. 2015
- ◇ **Accepted** as a Fellow of The Kavli Institute for Theoretical Physics (KITP) Graduate Fellowship for Fall 2014. 2014
- ◇ **Awarded** OSU Graduate and Professional Student Government Association (GPSGA) Travel award 2014
- ◇ **Awarded** the PITT PACC Travel award for the Phenomenology 2013 Symposium (Pheno'13). 2013
- ◇ **Awarded** the TASI Travel award for the TASI 2013. 2013
- ◇ **Awarded** SUSSP69 Bursary award for SUSSP69 in St. Andrews University, Scotland 2012
- ◇ **Awarded** Phi-Kappa-Phi Honor Society Membership for securing 4.0/4.0 GPA in Dept. of Physics, OSU. 2011
- ◇ **Awarded** the first place in first year exam and second place in final year exam in B.Sc. Physics Honors., Lady Brabourne College, University of Calcutta. 2003
- ◇ **Awarded** National Scholarship, Ministry of Human Resources Development, Government of India. 2001

8 COMPUTATIONAL EXPERTISE

- ◇ Mathematica, Fortran, C ++,
- ◇ Monte Carlo Parton-level integrations, PYTHIA, CalCHEP, LanHEP, FORM, FeynRules, HDECAY, MADGRAPH, ALPGEN
- ◇ SUSY spectrum generators SuSpect and Dark matter calculation with MicroOmega

9 MENTORING EXPERIENCE

- ◇ Advisor for Undergraduate research on theoretical particle physics, Physics department, College of the Holy Cross 2019
- ◇ Supervising undergraduate students in the Physics and Astronomy Department, Colby College with independent research projects 2017-2019
- ◇ Supervised graduate students at the University of Virginia with execution of dissertation research projects in theoretical physics 2015-2017

10 PROFESSIONAL AFFILIATIONS

- ◇ Journal Referee of `Physical Review D' since 2016
- ◇ Member of `American Physical Society' since 2012
- ◇ Member of `Phi-Kappa-Phi Honor Society' in OSU since 2011
- ◇ Member/Founder of `Women in Physics' group in UVa, Colby, Holy Cross.

- ◇ Member of Anacapa Society for theoretical and computational physics at Undergraduate institutions.

11 PROFESSIONAL DEVELOPMENT AND SERVICE

11.1 WORKSHOPS AND CONFERENCES

- ◇ International Conference in High Energy Physics (ICHEP) 2020 July 2020
- ◇ Fermi National Accelerator Laboratory Summer Visitor Program 2018 June 2018
- ◇ Co-organizer and Speaker at the APS 'Conferences for Undergraduate Women in Physics (CUWiP)', University of Virginia January 2018
- ◇ Talk at the American Physical Society (APS) April Meeting at Washington DC January 2017
- ◇ Co-organizer of 'Conference for Undergraduate Women in Physics (CUWIP)' at Old Dominion University January 2016
- ◇ 'Teaching with Technology' workshop, University of Virginia October, 2016
- ◇ 'Nurturing an Inclusive Classroom Community' workshop, University of Virginia
- ◇ 'Speaking with Impact' workshop for public speaking, University of Virginia Nov, 2015
- ◇ 'Course Design Institute', Center for Teaching Excellence, Colby College & UVa Jan'18/June '16
- ◇ '9th Annual National Institute of Health (NIH) Career Symposium, Bethesda, MD May '16

11.2 SERVICE

- ◇ Founder and Faculty Advisor for "Women in Physics" group in Holy Cross August, 2019
- ◇ Panel moderator for Academic Career panel at the Postdoctoral Career Symposium, University of Virginia Sep, 2016
- ◇ Judge for the Virginia Piedmont Regional Science Fair in Virginia. March 2016
- ◇ Judge (poster session) in 'Conference for Undergraduate Women in Physics (CUWIP)', Old Dominion University Jan, 2016
- ◇ Book reviewer for 'Group Theory in a Nutshell for Physicists' by Anthony Zee December, 2014

11.3 VOLUNTEERING EXPERIENCE

- ◇ Co-organized 'STEM day 2016' in University of Virginia with physics experiment demonstrations for middle school students around Charlottesville, VA 2016
- ◇ Presented in 3 Minute Thesis (3MT) Contest on 'Dark Matter' at Oklahoma State University 2015
- ◇ Volunteered for particle physics experiment demonstrations to high school students during Scottish Universities Summer School in Physics at St. Andrews, Scotland 2012

12 REFERENCES

Dr. Robert Bluhm
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Regents Professor in Physics
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Dr. John K. Pribram
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