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ACADEMIC POSITION	Postdoctoral Research Associate <a href="#">Darwin College, Cambridge</a> Supervisor: <a href="#">Prof. Nigel Cooper</a>	September 2018 - present
EDUCATION	<a href="#">Cornell University</a> , Ithaca, USA Ph.D. in Physics, 2018 Advisor: <a href="#">Prof. Erich Mueller</a> Dissertation: <a href="#">Collective Phenomena in Quantum Gases</a>	2012 - 2018
	<a href="#">Jadavpur University</a> , Kolkata, India B.E. in Electronics and Tele-Communication Engineering 1st class with Honours, CGPA: 9.42/10	2008 - 2012
AWARDS AND ACADEMIC ACHIEVEMENTS	Postdoctoral Fellowship at Max Planck-Harvard <a href="#">Center for Quantum optics</a> , 2018 (declined) Dr. V. Ramachandra Rao Summer Fellowship, Cornell University, 2013 Hartmann Memorial Teaching Award, Cornell University, 2012-13 <a href="#">Dr. Shyama Prasad Mukherjee (SPM) Fellowship</a> from the Council of Scientific and Industrial Research (CSIR), India, 2012 (declined) 1st all over India in the following competitive exams for research degrees in Physics: (i) CSIR National Eligibility Test ( <a href="#">NET</a> ) 2012, (ii) Joint Entrance Screening Test ( <a href="#">JEST</a> ) 2012, and (iii) Graduate Aptitude Test in Engineering ( <a href="#">GATE</a> ) 2011 Best paper award in National Students Paper and Circuit Design Contest ( <a href="#">NSPCDC</a> ) 2011, organised by IEEE [paper available at <a href="https://tinyurl.com/y4wuuedl">https://tinyurl.com/y4wuuedl</a> ] Late Supriya Basu Scholarship from Jadavpur University Alumni Association ( <a href="#">Mumbai Branch</a> ), 2010, for securing highest grade in all engineering departments 1st among 67,655 students in the West Bengal Joint Entrance Examination ( <a href="#">WBJEE</a> ) in Engineering, 2008 [ <a href="#">news article</a> on The Telegraph] – Gold medal from Howrah Zilla School 2nd in the statewide Achievement-cum-Diagnostic Test in Mathematics ( <a href="#">ADTM</a> ) 2007	
RESEARCH ACHIEVEMENTS	Discovered a dynamical instability of soliton trains in a Fermi gas [ <a href="#">PRL '17</a> ] and showed how they can be systematically driven to a long-sought-after superfluid state [ <a href="#">PRA '17</a> ] Devised a realisable protocol for preparing fractional quantum Hall states and braiding topological excitations in an optical cavity, in collaboration with ongoing experiments [ <a href="#">PRA '18</a> ] Showed how a quantum limit-cycle oscillator close to a critical point can sense extremely weak signals, beyond what is possible classically or in a passive system [ <a href="#">PRL '19</a> ] Discovered a hidden symmetry that stabilises controllable long-range entanglement in a qubit array, and showed how to prepare such states in existing photonic setups [ <a href="#">under review</a> ] Developed a computational technique that extends the Density Matrix Renormalisation Group to enable efficient simulation of continuous 1D quantum systems [manuscript in preparation]	

## PUBLICATIONS

[Summary with illustrations available at [shovandutta.org/research/#publications](http://shovandutta.org/research/#publications)]

9. **Shovan Dutta** and Nigel R. Cooper, “Out-of-equilibrium steady states of a locally driven lossy qubit array,” [arXiv:2007.08938](https://arxiv.org/abs/2007.08938) (2020)
8. **Shovan Dutta** and Nigel R. Cooper, “Long-range coherence and multiple steady states in a lossy qubit array,” [arXiv:2004.07981](https://arxiv.org/abs/2004.07981) (2020) [[slides](#)] [[poster](#)] [[10-min talk](#)]
7. **Shovan Dutta** and Nigel R. Cooper, “Critical Response of a Quantum van der Pol Oscillator,” *Phys. Rev. Lett.* **123**, 250401 (2019) [[pdf](#)] [[arXiv](#)] [[slides](#)] [[poster](#)] [[TCM highlight](#)]
6. **Shovan Dutta** and Erich J. Mueller, “Coherent generation of photonic fractional quantum Hall states in a cavity and the search for anyonic quasiparticles,” *Phys. Rev. A* **97**, 033825 (2018) [[pdf](#)] [[supplement](#)] [[arXiv](#)] [[news story](#)] [[slides](#)] [[poster](#)] [[animation](#)]
5. **Shovan Dutta** and Erich J. Mueller, “Protocol to engineer Fulde-Ferrell-Larkin-Ovchinnikov states in a cold Fermi gas,” *Phys. Rev. A* **96**, 023612 (2017) [[pdf](#)] [[arXiv](#)]
4. **Shovan Dutta** and Erich J. Mueller, “Collective Modes of a Soliton Train in a Fermi Superfluid,” *Phys. Rev. Lett.* **118**, 260402 (2017) [[pdf](#)] [[arXiv](#)] [[news story](#)] [[slides](#)] [[poster](#)]
3. **Shovan Dutta** and Erich J. Mueller, “Dimensional crossover in a spin-imbalanced Fermi gas,” *Phys. Rev. A* **94**, 063627 (2016) [[pdf](#)] [[arXiv](#)] [[slides](#)]
2. **Shovan Dutta** and Erich J. Mueller, “Kinetics of Bose-Einstein condensation in a dimple potential,” *Phys. Rev. A* **91**, 013601 (2015) [[pdf](#)] [[arXiv](#)] [[slides](#)]
1. **Shovan Dutta** and Erich J. Mueller, “Variational study of polarons and bipolarons in a one-dimensional Bose lattice gas in both the superfluid and the Mott-insulator regimes,” *Phys. Rev. A* **88**, 053601 (2013) [[pdf](#)] [[arXiv](#)] [[slides](#)]

## E-PRINTS

5. **Shovan Dutta**, “Collective Phenomena in Quantum Gases,” [PhD thesis](#) (2018)
4. **Shovan Dutta** and **Subhankar Ray**, “Damped bead on a rotating circular hoop - a bifurcation zoo,” [arXiv:1201.1218](https://arxiv.org/abs/1201.1218) (2012) [[slides](#)]
3. **Shovan Dutta** and **Subhankar Ray**, “Bead on a rotating circular hoop: a simple yet feature-rich dynamical system,” [arXiv:1112.4697](https://arxiv.org/abs/1112.4697) (2011)
2. **Shovan Dutta**, **Subhankar Ray**, and **J. Shamanna**, “Continuous Time Random Walk with time-dependent jump probability: A direct probabilistic approach,” [arXiv:1112.3253](https://arxiv.org/abs/1112.3253) (2011)
1. **Shovan Dutta**, “A simple circuit model showing feature-rich Bogdanov-Takens bifurcation,” [IEEE link](#) (2011) [won the National Students Paper and Circuit Design [Contest](#) 2011]

## NOTABLE TALKS

- “Long-range entanglement and multistability in a lossy qubit array,” Collective Phenomena Group Meeting (CPGM) Seminar, University of Cambridge, July 2020
- “Critical Response of a Quantum van der Pol Oscillator,” Centre for Condensed Matter Theory (CCMT) Seminar, Indian Institute of Science (IISc), December 2019
- “Critical Response of a Quantum van der Pol Oscillator,” [Joint DesOEQ-QSUM meeting](#), University of Oxford, September 2019
- “Critical Response of a Quantum van der Pol Oscillator,” Condensed Matter and Quantum Materials (CMQM) Conference, University of St Andrews, July 2019
- “Paving an enlightened path to anyons and quantum computation,” [Science Lunchtime Seminar](#), Darwin College, Cambridge, April 2019

- “Creating and Braiding Anyons in an Optical Cavity,” Department of Physics Seminar, University of Strathclyde, January 2019
- “Collective Dynamics of Solitons in Superfluids,” Research highlight for prospective graduate students, Department of Physics, Cornell University, March 2017

PUBLIC  
ENGAGEMENT

Newspaper articles and research highlights written for a general audience:

- [Surprising nature of quantum solitary waves revealed](#)
- [Researchers pave an enlightened path to anyons and quantum computation](#)
- [A quantum ear](#)

Non-technical summary and illustrations of research on personal website: [shovandutta.org](http://shovandutta.org)

Lunchtime seminars at Darwin college for non-physicists – see Talks above

Short presentations on YouTube: <https://tinyurl.com/yyqmc2d4>

WORK IN  
PROGRESS

- Dynamically induced phase transitions by resonant shaking (with [U. Schneider](#) and N. Cooper)
- Density Matrix Renormalisation Group in the continuum (with E. Mueller, [A. Buyskikh](#), and [A. Daley](#))
- Interferometric signatures of bosonic fractional quantum Hall states (with N. Cooper)
- Directed two-body propagation at an anyonic interface (supervising project student L. Lau)

TEACHING  
EXPERIENCE

- Head of class and co-examiner for [TP2: Advanced Quantum Mech.](#), Cambridge, Lent 2020
- Supervisor for [Part IB Physics A: 2nd year Natural Sciences](#), Cambridge, 2018-19  
Experimental methods, Waves, Quantum physics, Condensed matter physics
- Teaching assistant for a number of undergraduate courses at Cornell University, 2012-16  
Electromagnetism, Mechanics & special relativity, and courses for non-physics majors  
Details and student evaluations available at [shovandutta.org/teaching/](http://shovandutta.org/teaching/)

UNPUBLISHED  
RESEARCH

- Understanding nucleation of superfluid B phase in  $^3\text{He}$ , 2018 (with E. Mueller and [J. Parpia](#))
- Thermalisation in a quasi-one-dimensional quantum gas, 2015 [[manuscript](#)] [[slides](#)]
- Photoemission from thin semiconductor films, 2012 (with [C. Bose](#) and M. Bose)
- Liquid-gas phase transition of cold nuclear matter, 2011 (with [S. Ray](#) and [J. Shamanna](#))

EDITORIAL

Regular referee for PRL (since 2017), PRA (since 2018), and PRB (since 2019)

ADMINISTRATIVE

Co-organised the [Cavendish Quantum Colloquia](#), 2018-19, University of Cambridge