

# Dr. Saurabh Kumar Bose

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## Statement of purpose

I am a physicist interested in low dimensional electronic systems with research vision to utilize charge and spin degrees of freedom in nano-devices for technological advancement of our society. Keeping application as the ultimate goal, I enjoy investigating physical phenomenon in quest to understand the fundamental laws governing nature. My primary research interests are thin film heterostructures, organic-inorganic hybrid nano-devices, and Neuromorphic architectures for efficient computation.

Presently as Principal Investigator I am working on Marsden FastStart grant (NZD 300,000) from Royal Society of New Zealand on project titled '*Brain inspired on-chip computation using self-assembled nanoparticles*'. This position with 50% research & supervision and 50% teaching responsibilities has helped me grow as a researcher and a teacher. With a vision to nucleate and grow Hybrid Electronics And Mesoscopic Systems (HEAMS) Laboratory at a leading academic institution like Texas Tech University, I am applying for Assistant Professor position.

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## Career Highlights

- 2016 Prestigious Marsden FastStart grant from Royal Society of New Zealand as PI (\$300,000).
- 2016 International Patent Application PCT/NZ2016/050108 for Neuromorphic devices.
- 2015 Bose et al. Nature Nanotechnology paper being well recieved (40+ citations, 98 percentile).
- 2010 Best Ph.D. thesis award in DAE Solid State Physics Symposium.
- 2002 University Gold medal B.Sc. (Physics Honors), Banaras Hindu University.

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## Education and Experience

2017- present	Senior Research Fellow and Principal Investigator	School of Physical and Chemical Sciences, University of Canterbury, New Zealand
2015- 2017	Postdoctoral Researcher	School of Physical and Chemical Sciences, University of Canterbury, New Zealand
2011- 2014	Postdoctoral Researcher	NanoElectronics Group, University of Twente, Netherlands
2004 - 2010	Ph.D. (M.Sc.-Ph.D. Dual Degree) Course work C.P.I. (8.2/10) <b>Thesis:</b> Spin polarized transport in self-assembled Fe nano-plaquettes and distributed NbN-Fe-NbN Josephson junction arrays.	Department of Physics, Indian Institute of Technology Kanpur, India
2002 - 2004	M.Sc. (M.Sc.-Ph.D. Dual Degree) Course work C.P.I. (8.6/10)	Department of Physics, Indian Institute of Technology Kanpur, India
1999 - 2002	B.Sc. (Honors) Physics, First Division Marks: 77 % (Gold medal)	Banaras Hindu University, Varanasi, India

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## News and Media coverage

1. <http://www.canterbury.ac.nz/news/2017/uc-physicists-take-a-nano-chip-off-the-old-block.html>
2. <http://www.radionz.co.nz/news/national/325511/nz-scientists-take-on-tech-giants>
2. Bose et al. Nature Nanotech. 2015 covered by multiple science news outlets including Nature news.

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## Research Publications

1. Synaptic dynamics in complex self-assembled nanoparticle networks.  
S. K. Bose, S. Shirai, J. B. Mallinson, and S. A. Brown, *Faraday Disc.* (2018). DOI: 10.1039/c8fd00109j (IF: 3.4)
2. Stable Self-Assembled Atomic-Switch Networks for Neuromorphic Applications.  
S. K. Bose, J. B. Mallinson, R. M. Gazoni and S. A. Brown, *IEEE Trans. Elect. Dev.* 64, issue 12 (2017). (IF: 2.5)
3. Percolating Switching Devices.  
S. A. Brown, S. Fostner, S. K. Bose International Patent Appli. PCT/NZ2016/050108 (2016).
4. Evolution of a designless nanoparticle network into reconfigurable Boolean logic.  
S. K. Bose, C.P. Lawrence, Z. Liu, K.S. Makarenko, R.M.J. van Damme, H.J. Broersma and W.G. van der Wiel, *Nature Nanotech.* 10, 1048 (2015). (IF: 38.9)
5. Tuning the Kondo effect in thin Au films by depositing a thin layer of Au on molecular spin-dopants.  
D. Atac, T. Gang, M. Deniz Yilmaz, S. K. Bose, A. T. M. Lenferink, C. Otto, M. P. de Jong, J. Huskens, and W. G. van der Wiel, *Nanotech.* 24, 375204 (2013). (IF: 3.842)
6. Tunable doping of a metal with molecular spins.  
T. Gang, M. Deniz Yilmaz, D. Atac, S. K. Bose, E. Strambini, A. H. Velders, M. P. de Jong, J. Huskens, and W. G. van der Wiel, *Nature Nanotech.* 7, 232 (2012). (IF: 38.9)
7. Magnetoresistance studies of MeV ranged  $1\text{H}^+$  and  $12\text{C}^+$  ion irradiated HOPG flakes.  
Neeraj Shukla, Saurabh K. Bose, Shyam K. Choudhary, Himanshu Pandey, Mihir Sarkar, Nobin Banerji, Anjan K. Gupta, and Harish C. Verma, *J. Mag. Mag. Mat.* 324, 3887 (2012). (IF: 1.826)
8. Flux-closure pattern in a two-dimensional NbN-Fe superconductor-ferromagnet nanocomposite: Anisotropy of the angular magnetoresistance.  
S. K. Bose and R. C. Budhani, *J. Appl. Phys.* 108, 103916 (2010). (IF: 2.21)
9. Robust coupling of superconducting order parameter in a mesoscale NbN-Fe-NbN epitaxial structure.  
S. K. Bose and R. C. Budhani, *Appl. Phys. Lett.* 95, 042507 (2009). (IF: 3.794)  
Selected in [Virtual Journal of Applications of Superconductivity, August 1, 2009.]  
[Virtual Journal of Nanoscale Science & Technology, August 10, 2009.]
10. Design and fabrication of cryogenic probe for penetration depth measurements down to 1.8 K.  
S. K. Bose, K. Senapati and R. C. Budhani, *Jour. of Phys. Conf. Ser.* 150, 012005 (2009).
11. Percolative spin-dependent transport in mesoscopic epitaxial Fe plaquettes of tailored connectivity.  
S. K. Bose, R. Sharma, and R. C. Budhani, *Phys. Rev. B* 78, 115403 (2008). (IF: 3.767)
12. Lattice-mismatch-induced granularity in CoPt-NbN and NbN-CoPt superconductor-ferromagnet heterostructures: Effect of strain.  
R. K. Rakshit, S. K. Bose, R. Sharma, N. K. Pandey, and R. C. Budhani, *Phys. Rev. B* 77, 094505 (2008). (IF: 3.767)

13. Correlations between morphology, crystal structure, and magnetization of epitaxial cobalt-platinum films grown with pulsed laser ablation.  
R. K. Rakshit, S. K. Bose, R. Sharma, R. C. Budhani, T. Vijaykumar, S. J. Neena, and G. U. Kulkarni, *J. Appl. Phys.* 103, 023915 (2008). (IF: 2.21)
14. Stress-induced competing ferromagnetic and antiferromagnetic orders in epitaxial films of A-type antiferromagnet  $\text{La}_{0.45}\text{Sr}_{0.55}\text{MnO}_3$ .  
P. K. Muduli, S. K. Bose and R. C. Budhani, *J. Phys.: Condens. Matter* 19, 226204 (2007). (IF: 2.355)
15. Giant coercivity nanodots and fractals in CoPt films grown on (001)  $\text{SrTiO}_3$  using pulsed laser deposition.  
R. K. Rakshit, S. K. Bose, R. Sharma, and R. C. Budhani, *Appl. Phys. Lett.* 89, 202511 (2006). (IF: 3.794)
16. Growth of [110]  $\text{La}_{2/3}\text{Sr}_{1/3}\text{MnO}_3$  -  $\text{YBa}_2\text{Cu}_3\text{O}_7$  heterostructures.  
Soumen Mandal, Saurabh K. Bose, Rajeev Sharma, R. C. Budhani, Prahallad Padhan, and Wilfrid Prellier, *Appl. Phys. Lett.* 89, 182508 (2006). (IF: 3.794)

### Invited and Conference presentations

1. International Conference on Neuromorphic Systems (ICONS), July 23-26, 2018 at Knoxville, USA. (Oral)
2. Workshop on Molecular Architectonics - Toward Realization of Neuromorphic Computing by Nanomaterials, June 29-30, 2017 at Osaka, Japan. (Invited lecture)
3. 9<sup>th</sup> International Conference on Molecular Electronics and Bioelectronics (M&BE9), June 26-28, 2017 at Kanazawa, Japan. (Oral)
4. 8<sup>th</sup> International Conference on Advanced Materials and Nanotechnology, Feb 12 - 16, 2017 at Queenstown, New Zealand. (Oral)
5. International Conference on Nanoscience and Nanotechnology, Feb 7 - 11, 2016 at Canberra, Australia. (Oral)
6. MacDiarmid Institute Student & Postdoc Symposium, Nov 19 - 20, 2015 at Wellington, New Zealand. (Poster)
7. Foundation for Fundamental Research on Matter conference (Physics@FOM), Jan 21 - 22, 2014 at Veldhoven, Netherlands. (Poster)
8. 31<sup>st</sup> International Conference on Physics of Semiconductors, Jul 29 - Aug 3, 2012 at Zurich, Switzerland. (Oral)
9. 55<sup>th</sup> DAE Solid State Physics Symposium, Dec 26 - 30, 2010 at Manipal, India. (Oral & Poster)
10. International Conference on Quantum Effects in Solids of Today (I-ConQuEST), Dec 20 - 23, 2010 at New Delhi, India (Poster)
11. International Conference on Magnetic Materials, Oct. 25 - 29 2010 at SINP, Kolkata, India. (Oral)
12. 11<sup>th</sup> Joint MMM/Intermag Conference, Jan 18 - 22, 2010 at Washington, DC, USA. (Oral)
13. 54<sup>th</sup> DAE Solid State Physics Symposium, Dec 14 - 18, 2009 at Vadodara, India. (Poster)
14. Homi Bhabha Centenary DAE-BRNS National Conference & HRI School on Spintronic and Magnetoelectronic Materials and Devices', Jan 08 - 10, 2009 at Puri, India. (Oral)
15. 25<sup>th</sup> International Conference on Low Temperature Physics (LT-25), Aug 06 - 13, 2008 at Amsterdam, Netherlands. (Two posters)

16. International Workshop on Physics of Mesoscopic and Disordered Materials, Dec 04 - 08, 2006 at Kanpur, India. (Poster)
  17. Condensed Matter Physics Workshop, Feb 2005 at Kanpur, India. (Poster)
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### **Teaching and Supervision Experience**

- 2017-2018 Co-Supervisor for ongoing three PhD thesis students, Univ. Canterbury, New Zealand
- 2017-2018 Lecturer for condensed matter courses Level 2, 4, Univ. Canterbury, New Zealand
- 2015-2018 Supervision of Bachelor students (3) for projects, Univ. Canterbury, New Zealand
- 2013 Supervision of Bachelor student for Internship project, Univ. Twente, Netherlands
- 2008 Tutor in B. Tech. 1st year compulsory course in Physics, I.I.T. Kanpur, India.
- 2004-2006 Teaching assistant in M. Sc. Physics Laboratories, I.I.T. Kanpur, India
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### **Honors & Awards**

1. Two Poster presentation runner-up awards for my student posters in AMN8 conf.- Feb 2017
  2. Prestigious Marsden FastStart research grant from Royal Society of New Zealand as Principal Investigator (\$300,000)- Nov 2016
  3. Best Thesis award in DAE Solid State Physics Symposium- Dec 2010
  4. Best Poster presentation award in I-ConQuEST- Dec 2010
  5. Best Poster presentation award in DAE Solid State Physics Symposium- Dec 2009
  6. Best Poster presentation award in CMP workshop- Feb 2005
  7. Qualified for Junior Research Fellowship in the National Eligibility Test (India)- Jun 2005
  8. Qualified for Lectureship in the National Eligibility Test (India)- Jun 2004
  9. University Gold medal for securing first rank B.Sc. (Physics Honors) - Jun 2002
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### **Additional Skills/Experience**

Reviewer experience: Applied Physics Letters, Journal of Applied Physics, and conference papers.

Software skills: MS Office, Latex, Origin, Mathematica, COMSOL Multiphysics.

Programming Languages: Matlab, LabView, Qbasic, Visual Basic, Fortran.

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### **Personal Details**

Gender: Male

Date and place of birth: 3rd June, 1981, Bokaro Steel City (Jharkhand), India

Present Citizenship: Indian

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## References

These persons are familiar with my professional qualifications and my character:

**Prof. R. C. Budhani**

Senior Associate, National Research Council,  
United States National Academy of Sciences,  
Air Force Research Laboratory, Ohio, USA

(Ph.D. Thesis Supervisor)

Phone: NA  
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**Prof.dr.ir. W. G. van der Wiel**

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