Shonali Dhingra

Curriculum Vitae

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DOB - August 9, 1985
Nationality - Indian

Employment

2021– **Postdoctoral Scholar**, *Zentrum für Regenerative Therapien TU Dresden (CRTD)*, Germany.

2015–2020 **Postdoctoral Scholar**, *University of California - Los Angeles*, Dept of Physics and Astronomy, USA.

Education

2008–2015 **Ph.D. Physics**, *University of Pittsburgh*, USA, 3.82 GPA.

2006–2008 **M.Sc. (Honors) Physics**, *St. Stephens College*, University of Delhi, India, 71.1% (>3.5 GPA).

2003–2006 **B.Sc. (Honors) Physics**, *St. Stephens College*, University of Delhi, India, 79.1%(>3.5 GPA).

Current Neuroscience Research

Title *Decoding the computational role of adult neurogenesis in hippocampus*

Supervisor Professor Federico Calegari, CRTD at TU Dresden

Description In my current position I study a unique hippocampal sub-region, the dentate gyrus (DG). DG is one of the only two regions in the brain that undergo adult neurogenesis, which is thought to aid with the formation of new memories and learning of novel tasks. I independently set up *in-vivo* neuroelectrophysiology in the Calegari lab and am now using this technique to study the computational role of DG adult neurogenesis in various memory processes in the mouse brain.

Past NeuroPhysics Research

Title *Developing techniques to study Neuroscience using concepts and methodologies of Nanotechnology*

Supervisor Professor Mayank Mehta, W. M. Keck Center for Neurophysics at UCLA

Description My first exploration in Neuroscience began with studying the brain's seat of memory and learning, the Hippocampus. Using the rat model and electrophysiology, I acquired and analyzed Hippocampus CA1 neural responses to surrounding space and various external stimuli. Also, using my expertise in nanotechnology, I started the development of a completely new technique to acquire neural responses using optics and nanomaterials.

PhD Physics Thesis Research

Title *Quadratic coupling between a classical nanomechanical oscillator and a single spin*

Supervisor Assistant Professor Brian R. D'Urso, University of Pittsburgh

Description I theoretically proposed and experimentally realized a system consisting of a nanomechanical oscillator (NMO) coupled with a single spin through a uniform external magnetic field, enabling a bridge between the quantum and classical worlds. The NMO was fabricated using graphene and the spin originated from a nitrogen vacancy (NV) center in a diamond nanocrystal. Both these systems were individually characterized and their coupling was explored by a simple readout of the NV center spin and observation of the discrete states of the NMO.

Research Experience

Experimental **Instruments and Techniques**.

- Designing and building electrical drives for surgical cranial implantation over mouse and rat brain
- Designing, implementing and analyzing behavioral memory tasks in real world and VR for mice and rats
- Mouse and rat handling, task-training and cranial surgeries
- Working with various autistic rat models, and comparisons with wild types.
- NeuroElectrophysiology
- Immunohistochemistry
- Optical setups (Confocal and Fluorescence), Raman, scanning electron and optical microscopes
- Microfabrication using lithography (photo and deep UV), etching (chemical and plasma), diamond turning machine, sputtering systems and chemical vapor deposition
- Cryogenic ($\sim$4 K, using pulse tube cryorefrigerator) and vacuum systems
- RF and Microwave signal acquisition and processing

Computational **Languages, Softwares and Techniques**.

- MATLAB, Python, Mathematica
- OpenEphys, Neuralynx, Bonsai, DeepLabCut, Plexon Offline Sorter
- Arduino Microcontroller programming
- AutoCAD (2D and 3D), Inkscape, Affinity Designer, ImageJ, Solidworks, Google SketchUp
- LaTeX

Proficient at leading research projects with graduate and undergraduate students.

Journal Publications

2023 M.Shahi*, **S. Dhingra***, R. Sandler, M. Mehta, *Hippocampal head direction tunings*, In Preparation

2023 G.Berdugo-Vega*, **S. Dhingra***†, F. Calegari†, *Sharpening the blades of the dentate gyrus*, **The EMBO Journal**, e113524

2022 C. Purandare*, **S. Dhingra***, R. Rios, C. Vuong, T. Tu To, A. Hachisuka, K. Choudhary, M. Mehta, *Moving bar of light evokes vectorial spatial selectivity in the immobile rat hippocampus*, **Nature**, 602(7897), 461-467

2017 **S. Dhingra** and B. D'Urso, *Nitrogen Vacancy centers in diamonds as angle-squared sensors*, **Journal of Physics: Condensed Matter**, 29(18), 185501

2017 J. F. Hsu, **S. Dhingra**, B. D'Urso, *Design and construction of a cost-efficient arduino-based galvanometer mirror system for scanning optical microscopy*, **American Journal of Physics**, 85(1), 68-75

2016 J. Li, J. F. Hsu, H. Lee, S. Tripathi, Q. Guo, L. Chen, M. Huang, **S. Dhingra**, J. Lee, C. B. Eom, P. Irvin, J. Levy, and B. D'Urso., *Method for Transferring High-Mobility CVD-Grown Graphene with Perfluoropolymers*, **arXiv**, 1606.08802v1

2016 D. P. Gopalan, P. C. Mende, S. C. de la Barrera, **S. Dhingra**, J. Li, K. Zhang, N. A. Simonson, J. A. Robinson, N. Lu, Q. Wang, M. J. Kim, B. D'Urso, R. M. Feenstra, *Formation of hexagonal Boron Nitride on Graphene-covered Copper Surfaces*, **Journal of Materials Research**, 31 (7)

2015 M. Huang, G. Jnawali, J. F. Hsu, **S. Dhingra**, H. Lee, S. Ryu, F. Bi, F. Gharari, J. Ravichandran, L. Chen, P. Kim, C. B. Eom, B. D'Urso, P. Irvin, and J. Levy, *Electric Field Effects in Graphene/$LaAlO_3$/$SrTiO_3$ Heterostructures and Nanostructures*, **Applied Physics Letters - Materials**, 3, 062502

2015 A. Choudhary, S. J. Beecher, **S. Dhingra**, B. D'Urso, T. L. Parsonage, J. A. Grant-Jacob, P. Hua, J. I. Mackenzie, R. W. Eason, D. P. Shepherd, *456 mW graphene Q-switched Yb:yttria waveguide laser by evanescent-field interaction*, **Optics Letters**, 40(9), 1912-1915

2015 A. Choudhary, **S. Dhingra**, B. D'Urso, P. Kannan and D. P. Shepherd, *Graphene Q-switched mode-locked and Q-switched ion-exchanged waveguide lasers*, **Photonics Technology Letters, IEEE**, 27 (6), 646-649

2014 A. Kozbial, Z. Li, C. Conaway, R. McGinley, **S. Dhingra**, V. Vahdat, F. Zhou, B. D'Urso, H. Liu and L. Li, *Study on the surface energy of graphene by contact angle measurement*, **Langmuir**, 30 (28), 8598-8606

2014 A. Choudhary, **S. Dhingra**, B. D'Urso, T. L. Parsonage, K. A. Sloyan, R. W. Eason and D. P. Shepherd, *Q-switched operation of a pulsed-laser-deposited Yb: Y_2O_3 waveguide using graphene as a saturable absorber*, **Optics Letters**, 39(15), 4325-4328

2014 **S. Dhingra**, J. F. Hsu, I. Vlassiouk, and B. D'Urso, *Chemical vapor deposition of graphene on large-domain ultra-flat copper*, **Carbon**, 69, 188-193

2011 B. D'Urso, M. V. G. Dutt, **S. Dhingra** and N. M. Nusran, *Quantum measurements between a single spin and a torsional nanomechanical resonator*, **New Journal of Physics**, 13, 045002

Selected Scientific Presentations

2023 **Organized satellite symposium**, Adulting neurons keep memories young*, IBRO*, Granada, Spain, Invited speakers: Nora Abrous, Jill Leutgeb, Alejandro Schinder, etc..

2022 **Poster**, *Cosyne*, Lisbon, Portugal, **S. Dhingra**, C. Purandare, M. Mehta.

2019 **Poster**, *SfN Neuroscience Meeting*, Chicago, Illinois, USA, M.Shahi, **S. Dhingra**, R. Sandler, R. Rios, C. Vuong, L. Acharya, M. Mehta.

2018 **Poster**, *SfN Neuroscience Meeting*, San Diego, California, USA, **S. Dhingra**, M.Shahi, R. Sandler, R. Rios, C. Vuong, L. Acharya, M. Mehta.

2017 **Poster**, *SfN Neuroscience Meeting*, Washington DC, USA, **S. Dhingra**, R. Sandler, R. Rios, C. Vuong, M.Shahi, L. Acharya, A. Hachisuka, M. Mehta.

Oral, *APS March Meeting*, New Orleans, USA, **S. Dhingra**, R. Sandler, R. Rios, C. Vuong, M. Mehta.

2016 **Poster**, *SfN Neuroscience Meeting*, San Diego, California, USA, **S. Dhingra**, R. Sandler, C. Vuong, L. Acharya, M. Mehta.

2015 **Oral**, *APS March Meeting*, San Antonio, USA, **S. Dhingra**, B. D'Urso.

2014 **Oral**, *Gordon Research Seminar*, Ventura, USA, **S. Dhingra**, B. D'Urso.

Oral, *APS March Meeting*, Denver, Colorado, USA, **S. Dhingra**, B. D'Urso.

2013 **Oral**, *Invited Talk*, National University of Singapore, Singapore, **S. Dhingra**, B. D'Urso.

Oral, *APS March Meeting*, Baltimore, USA, **S. Dhingra**, J. F. Hsu, B. D'Urso.

2012 **Oral**, *Invited Talk*, Tata Institute of Fundamental Research, India, **S. Dhingra**, B. D'Urso.

Teaching and Mentoring Experience

2023 Mentored two groups in the Neuromatch Academy computational neuroscience course

2021-2023 Gave lectures in various Neuroscience masters' modules at CRTD, Dresden, Germany

2017–2013 Taught 3 'Introduction to Physics' (calculus/algebra-based) courses at UCLA and University of Pittsburgh

2010–2013 Served as a Student Mentor for counseling physics graduate students

2008–2009 Teaching Assistant for 4 'Introduction to Physics (algebra/calculus-based)- I/II' courses at University of Pittsburgh

Scholarships and Awards

2017, 2016 Travel awards from Brain Research Institute at UCLA to attend SfN meetings

2014 Pittsburgh Quantum Institute (PQI) Graduate Fellowship for excellence in graduate research

2011 Thomas Lain Scholarship in the Dept of Physics and Astronomy, University of Pittsburgh, USA

2003–2006 Received scholarships from Delhi University, India for academic excellence in bachelor studies

Outreach and Media Coverage

2022-2023 Set-up neuroscience booth at the Dresdner Lange Nacht der Wissenschaften (Dresden Long Night of Science) and received amazingly positive response

https://www.nature.com/articles/d41586-019-02154-x

https://apswebcasting.com/webcast/archive/aps/march2017/mar15-17-4.php

https://www.youtube.com/watch?v=gy64OKsfCfQ

https://www.pqi.org/videos/pqi-graduate-student-profile-shonali-dhingra