Niket H. Thakkar

Institute for Disease Modeling
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Summary

Experience in theoretical physics, software development, optics, epidemiology, statistical inference, data analysis, optimization, and applied mathematics. **Recipient of the National Science Foundation Graduate Research Fellowship.** Self-motivated, creative, hardworking, and collaborative researcher with a broad quantitative background and a **Doctoral degree in Applied Mathematics from the University of Washington**.

Skills include:

- Python, C++, Fortran, Matlab, and SQL.
- Mathematical concepts such as dynamical systems, partial differential equations, regression, numerical analysis, statistical inference, and uncertainty quantification.
- Writing in LaTex and Microsoft Word.
- Scientific graphic design in Inkscape.
- Machine learning in Theano and Keras.

Research Experience

2017 –   Machine Learning Research Scientist (Institute for Disease Modeling)

Worked with a collaborative team to develop machine learning and statistical models of measles dynamics in a variety of settings globally. Used neural network time series analysis, Bayesian inference, and particle filtering techniques to analyze large sets of data and create predictive models of disease outbreak. Work has been used to inform supplemental immunization campaign strategies in Nigeria and measles eradication efforts of the Bill and Melinda Gates Foundation.

2011 – 2017   Research Associate and NSF Graduate Fellow (U. Washington)

Conducted research on nanophotonics and plasmonics with Prof. David Masiello. Created mathematical models using Hamiltonian dynamical systems that facilitated the design of novel experimental techniques and nanoscale devices and continue to be used by researchers in the field today. Used numerical simulation to bench mark and parameterize analytic models. Work published in journals such as *Nature Photonics*, *ACS Nano*, and *ACS Photonics*, and received awards such as the Boeing Research Award.

2010 – 2011   Research Associate, FACTA 319 Study (U. Arizona)

Conducted research and data-collection to access the validity of credit reports with Prof. Mike Staten under the Fair and Accurate Credit Transactions Act (FACTA). Represented subjects in dispute claims against credit reporting agencies, helping them to gain financial stability. Conducted economic and statistical analysis of the data.

2009 − 2010   Researcher, Renewable Energy (U. Arizona)

Conducted research on solar energy devices with Prof. Alex Cronin in collaboration with Tucson Electric Power (TEP). Created a first principles mathematical model of the TEP solar yard which accounted for the nonlinear loss of power due to shadows from nearby objects. This model was used to restructure the solar yard and increase output by 22% in the month of December (3.8% annually). Received a Nasa Space Grant to fund this work, and published in *PVSC IEEE* conference proceedings.

Fellowships, Awards, and Honors

2017	University of Washington Graduate Medal
2017	Profiled by the UW Graduate School
2016	Research featured in C&E News and Nature News & Views
2016	Selected to speak at the Gordon Conference Seminar
2015	Boeing Research Award for Excellence in Applied Mathematics
2014	Elected Outreach Coordinator for UW SIAM Student Chapter
2013	NSF Graduate Research Fellowship Recipient
2008	NASA Space Grant Recipient
2009	AzRISE Solar Research Stipend
2010	CRLA Tutor Certification
2007 − 2011	Dean's List with Distinction

Education

2017	PhD	Applied Mathematics	University of Washington
2012	MS	Applied Mathematics	University of Washington
2011	BS	Physics (with Honors)	University of Arizona
2011	BS	Mathematics	University of Arizona
2011	BA	Economics	University of Arizona

Undergraduate Grade Point Average: 3.808
Graduate Grade Point Average: 3.79
Ph.D. Advisor: Professor David Masiello

Publications (Citations: > 135)

1. **Thakkar, N.**, Cherqui, C., Masiello, D.J., 2016 *Quantum Plasmon Resonances in Active Environments.* Under Review at Physical Review Letters.

2. Heylman, K., **Thakkar, N.**, Horak, E., Quillin, S., Cherqui, C., Masiello, D.J., Goldsmith, R. 2016, November. *Optical Microresonators as Single Particle Absorption Spectrometers.* Nature Photonics, 10(12), pp.788-795.

3. Schimpf, A.M., **Thakkar, N.**, Gunthardt, C.E., Masiello, D.J. and Gamelin, D.R., 2013. *Charge-tunable quantum plasmons in colloidal semiconductor nanocrystals.* ACS nano, 8(1), pp.1065-1072.

4. **Thakkar, N.**, Schimpf, A.M., Gunthardt, C.E., Gamelin, D.R. and Masiello, D.J. *Comment on "HgS and HgS/CdS Colloidal Quantum Dots with Infrared Intraband*

Transitions and Emergence of a Surface Plasmon". The Journal of Physical Chemistry, 120(50), pp.28900-28902.

5. **Thakkar, N.**, Cormode, D., Lonij, V., Pulver, S. and Cronin, A.D., 2010, June. *A simple non-linear model for the effect of partial shade on PV systems.* In Photovoltaic Specialists Conference (PVSC), 2010 35th IEEE (pp. 002321-002326). IEEE.

6. **Thakkar, N.**, Cherqui, C. and Masiello, D.J., 2015. *Quantum Beats from Entangled Localized Surface Plasmons.* ACS Photonics, 2(1), pp.157-164.

7. Litz, J.P., **Thakkar, N.**, Portet, T. and Keller, S.L., 2016. *Depletion with Cyclodextrin Reveals Two Populations of Cholesterol in Model Lipid Membranes.* Biophysical journal, 110(3), pp.635-645.

8. Cherqui, C., **Thakkar, N.**, Li, G., Camden, J.P. and Masiello, D.J., 2016. *Characterizing localized surface plasmons using electron energy-loss spectroscopy.* Annual Review of Physical Chemistry, 67, pp.331-357.

9. Cherqui, C., Wu, Y., Li, G., Quillin, S.C., Busche, J.A., **Thakkar, N.**, West, C., Montoni, N.P., Rack, P.D., Camden, J.P. and Masiello, D.J., 2016. *STEM/EELS Imaging of Magnetic Hybridization in Symmetric and Symmetry-Broken Plasmon Oligomer Dimers and All-Magnetic Fano Interference.* Nano Letters, 16(10), pp.6668-6676.

10. Wu, Y., Li, G., Cherqui, C., Bigelow, N.W., **Thakkar, N.**, Masiello, D.J., Camden, J.P. and Rack, P.D., 2015. *An electron energy loss spectroscopy study of the full plasmonic spectrum of self-assembled Au-Ag alloy nanoparticles: unraveling size, composition, and substrate effects.* ACS Photonics, 3(1), pp.130-138.

11. **Thakkar, N.H.**, 2011. *An Effective Field Theory for Feshbach Resonance in a Two-Body System.* UA Campus Repository: Honors Theses.

12. **Thakkar, N.** Rea, M., Smith, K.C., Heylman, K., Quillin, S., Goldsmith, R., Masiello, D.J., 2016. *Sculpting Fano Resonances with Thermal Annealing in Hybrid Plasmonic-Photonic Systems.* In preparation.

13. **Thakkar, N.** Heylman, K., Cherqui, C., Quillin, S., Goldsmith, R., Masiello, D.J., 2016. *Microresonator Enabled Long Range Hybridization of Surface Plasmons.* In preparation.

Selected Outreach Activities

- **Conference Talks:** Gordon Conference (2016), ACS Denver (2015), NASA Space Grant Symposium (2008)

- **Referee for:** Physical Review B, Journal of Applied Physics

- **Poster Presentations:** TACC (2016), Gordon Conference (2016), SIAM UQ (2014), AzRISE Poster Session (2009)

- **Freedom Education Project Puget Sound, volunteer teacher:** I volunteer as a math teacher and am part of a nonprofit, accredited college program for prisoners at the Washington Corrections Center for Women.

- **UW Math Fair coordinator and volunteer:** As a UW math fair volunteer, I create and engage in math based activities for elementary school students in Seattle. I have participated in this event regularly and organized and managed it.

- **UW Dream Project Mentor:** The UW Dream Project offers underrepresented and low income students around Seattle help with their college applications. As a mentor, I help high school seniors with any part of their applications, including personal statements and short response essays.

- **Julia Robinson Math Festival Volunteer:** The Julia Robinson Math Festival is a math outreach event that happens at college campuses around the country. Students from 4th to 12th grade non-competitively approach a variety of challenging (sometimes unsolved) math problems with mentoring and explanation from volunteers like me.

Teaching Experience

- **Freedom Education Project Puget Sound, volunteer instructor:** I volunteer as a math teacher and am part of a nonprofit, accredited college program for prisoners at the Washington Corrections Center for Women. I write course material, determine the syllabus, lecture, and grade for Math 107, accredited through Tacoma Community College

- **Lecturer for the Arizona Center for STEM Teachers:** I spent 3 days at the Biosphere2 teaching underfunded high school and middle school teachers from all over Arizona the physics and optics behind cutting edge solar technology. In addition to teaching the physics portions of the lectures, I worked with graduate students from the UA education department to create a full curriculum on solar technology for middle school teachers to use in the classroom.

- **Teacher's Assistant for the Office of Economic Education:** I TA'ed two courses geared towards preparing Arizona economics teachers for the Arizona Education Proficiency Assessment in Economics. Over 50 high school teachers attended these courses, where I lead group sessions to help with homework and other questions. Through these courses, high school teachers could get the required number of college credits to automatically pass their exam.

- **CRLA Certified Tutor at the UA SALT Center:** I tutored students with learning disabilities, and I was responsible for creating lesson plans, conducting group sessions, and helping individual students withs a variety of math, economics, and engineering physics courses. I worked here for 17 months, and was recognized as tutor of the month multiple times.

- **U.W. Teacher's Assistant Positions:** I have TA'ed the following University of Washington courses: Math 124, Math 125, Physics 119, Chemistry 550, Applied Math 352, Chemistry 457.