# Poornima Ramesh

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## Education

**PhD in Machine Learning for Science, supervised by Prof. Dr. Jakob Macke** **2018–Current**
Technical University of Munich and University of Tübingen, Germany

**BS-MS Dual Degree in Physics, GPA: 9.16** **2013–2018**
Indian Institute of Science Education and Research (IISER) Kolkata, India

**Indian School Certificate, 94.40%** **2013**
Cathedral and John Connon School, Mumbai, India

## Research Experience

**PhD Research, supervised by Prof. Dr. Jakob Macke** **August 2018 - Current**
*Technical University of Munich and University of Tübingen, Germany*
Developing statistical and deep learning methods for neural data:

- Characterizing retinal ganglion cell responses to electrical stimulation using generalized linear models (Sekhar et al., 2018)
- Generative adversarial networks for characterising variability in neural data (Ramesh et al., 2019)
- Statistical methods to decode stimulus identity from neural responses to electrical stimulation (Corna et al., 2021)
- Generative adversarial networks for simulation-based inference.
- Adversarial inference for climate models of the El-Niño effect.
- Adversarial lerning of synaptic plasticity rules

**Internship and Masters thesis, supervised by Dr. Jakob Macke** **2016 - 2018**
*Forschungszentrum caesar, Bonn, Germany*
Characterising single neuron responses to electrical stimulation using generalised linear models

**Project, supervised by Dr. Supratim Sengupta** **2017**
*Indian Institute of Science Education and Research (IISER) Kolkata, India*
Evolutionary dynamics and game theory; using stochastic methods to model rock-paper-scissors dynamics in diffusing bacterial populations

**Internship, supervised by Dr. Oishee Chakrabarti** **Summer 2015**
*Saha Institute of Nuclear Physics, Kolkata, India*
Experimental investigation of the role of ESCRT proteins in cell death

**Project, supervised by Dr. Sukant Khurana** **2014 - 2015**
*Indian Institute of Science Education and Research (IISER) Kolkata, India*
Theoretical work on neurogenesis and BDNF - their role in major depressive disorders; biological applications of transcranial magnetic stimulation

**Internship, supervised by Prof. Dipak Dasgupta** **Summer 2014**
*Saha Institute of Nuclear Physics, Kolkata, India*
Biophysical techniques to study biomolecular recognition

## Work Experience

- Intern at IDinsight (Delhi Office), India using machine learning to predict out-of-school girls in rural India 2021
- Volunteer with Soforthilfe-Corona Bayern, Munich, Germany 2020
- Volunteer translator and data analyst for Crowdfight COVID-19 2020
- Freelance transcriber for CastingWords 2017
- Junior reporter for Daily News and Analysis (DNA) India 2010-2011

## Skills

- **Programming:** Python: numpy, scikit-learn, PyTorch for deep learning, Theano; MATLAB; C++; LaTeX
- **Languages:** English, Tamil, Hindi, Bengali, German
- **Mathematics:** Machine learning, probability and statistics, signal processing, linear algebra, dynamical systems

## Scholarships and Awards

- Kishore Vaigyanik Protsahan Yojana Fellowship 2013–2018
- Deutsche Akademischer Austauschdienst (DAAD) WISE Fellowship 2016
- Indian National Biology Olympiad: Distinction 2012
- Indian National Physics Olympiad: Distinction 2012
- Science Olympiad Foundation's National Science Olympiad: City Rank 2 2011
- Mahindra Scholarship 2010–2011

## Teaching

- Module on Large Scale Modeling and Large Scale Data Analysis, Technical University of Munich 2019–2020
- Fundamentals of Mathematics for Neuroengineering, Technical University of Munich 2018–2019
- Teaching assistant: Numerical Methods for Physics, Indian Institute of Science Education and Research (IISER) Kolkata Autumn 2017

## Professional Activities

- Reviewer for Journal of Computational Neuroscience, International Conference on Machine Learning (ICML), Neural Information Processing Systems (NeurIPS), International Conference on Learning Representations (ICLR)
- Supervision of student for Masters' thesis

## Workshops and Courses

- Munich Brain Course at LMU, Munich, Germany 2019
- CAJAL Course for Computational Neuroscience, Lisbon, Portugal 2018
- School for Mining and Modeling of Neuroscience Data at University of California, Berkeley, USA 2017
- Workshop on Brain, Computation and Learning at IISc, Bengaluru, India 2017
- Physics of Life Monsoon School at NCBS, Bengaluru, India 2015
- Vijyoshi Science Camp at IISc, Bengaluru, India 2013, 2014

## Invited Talks

- Tübingen AI Symposium 2020
- Real Neurons & Hidden Units Workshop, Neural Information Processing Systems 2019 Conference 2019

## Publications

### Peer-reviewed Articles

**Ramesh, Poornima**, Mohamad Atayi, and Jakob H Macke (2019b). "Adversarial training of neural encoding models on population spike trains". In: *NeuroAI Workshop, Neural Information Processing Systems 2019, Vancouver, Canada*.

*Sekhar, Sudarshan, ***Ramesh, Poornima**, *Giacomo Bassetto, Eberhart Zrenner, **Jakob H. Macke, and **Daniel L. Rathbun (2020). "Characterizing Retinal Ganglion Cell Responses to Electrical Stimulation Using Generalized Linear Models". In: *Frontiers in Neuroscience* 14, p. 378. ISSN: 1662-453X.

Corna, Andrea, **Ramesh, Poornima**, Florian Jetter, Meng-Jung Lee, Jakob H. Macke, and Guenther Zeck (May 2021). "Discrimination of simple objects decoded from the output of retinal ganglion cells upon sinusoidal electrical stimulation". In: *Journal of Neural Engineering*. ISSN: 1741-2552.

### Conference Presentations

**Ramesh, Poornima**, Mohamad Atayi, and Jakob H Macke (2019a). "Adversarial training of neural encoding models". In: *Bernstein Conference 2019, Berlin, Germany*.

**Ramesh, Poornima**, Mohamad Atayi, and Jakob H Macke (2019c). "Adversarial training of neural encoding models on population spike trains". In: *Conference on Cognitive Computational Neuroscience 2019, Berlin, Germany*.

*Sekhar, Sudarshan, ***Ramesh, Poornima**, *Giacomo Bassetto, Eberhart Zrenner, **Daniel L Rathbun, and **Jakob H Macke (2018). "Characterizing retinal ganglion cell responses to electrical stimulation using generalized linear models". In: *Bernstein Conference 2018, Berlin, Germany*.

### Under Review

**Ramesh, Poornima**, Jan-Matthis Lueckmann, Jan F. Boelts, Alvaro Tejero-Cantero, David S. Goncalves Greenberg, Pedro J., and Jakob H. Macke (2020). *GATSBI: Generative adversarial training for simulation-based inference.*

## References

**Prof. Dr. Jakob Macke**
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**Dr. Pedro J. Goncalves**
*Forschungszentrum caesar, Bonn, Germany*
Email: Pedro.Goncalves@caesar.de

* Equal contribution
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