

# Saikat Banerjee

STATISTICAL GENETICS · BAYESIAN METHODS · SYSTEMS MEDICINE · DATA SCIENCE

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🎂 8 Sep. 1985 | 🇮🇳 Indian

🎓 Publications (Google Scholar)



## Experience

### Postdoctoral Fellow, Max Planck Institute for Biophysical Chemistry

Göttingen, Germany

ADVISOR: DR. JOHANNES SÖDING

May 2015 – Present

- Bayesian multiple logistic regression methodology for post-GWAS analyses including variable selection.
- Hypothesis test for accurate, powerful and large-scale identification of trans-eQTLs; Discovered more than 3000 trans-eQTLs from the GTEx data.
- Bayesian theory for integrating GWAS and eQTL data for identifying intrinsic causal mediations, work in progress.
- Presented our work at ISMB2019, Basel. Invited to speak at the University of Göttingen.

### Co-founder, Beejig

Bengaluru, India

A B2B COMPANY FOR WORD-OF-MOUTH MARKETING

Jan. 2012 – Sep. 2013

- Extensively involved in conceptualization, market research, app development, fundraising and recruitment.

## Education

### PhD (Statistical Physics), Indian Institute of Science

Bengaluru, India

ADVISOR: PROF. BIMAN BAGCHI

Aug. 2009 – Apr. 2014

- Diffusion equation for a rugged potential energy landscape.
- Understanding the origin of long-range hydrophobic force.
- Role of biological water in the hydration shell of proteins.
- Hydrophobicity and composition-dependent anomalies in aqueous binary mixtures.
- Administration and maintenance of high performance computing (HPC) cluster from Sep. 2011 to Apr. 2015.

### M.S. (Chemistry), Indian Institute of Science

Bengaluru, India

ADVISOR: PROF. BIMAN BAGCHI

Aug. 2007 – Jun. 2009

- Relevant Courses: Statistical Physics, Physical Chemistry, Thermodynamics, Basic probability theory.
- Class rank 2<sup>nd</sup> with a CGPA of 6.9 out of 8.

### B.Sc., University of Calcutta

Calcutta, India

RAMAKRISHNA MISSION VIDYAMANDIRA

Aug. 2004 – May 2007

- Major in chemistry, with physics and mathematics as auxiliary subjects.
- Ranked 1<sup>st</sup> in the University of Calcutta.







## Software

**B-LORE** Bayesian multiple logistic regression with variable selection.

**TEJAAS** L<sub>2</sub> regularized 'reverse' multiple linear regression for discovering trans-eQTLs.

## Publications

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-  Bayesian multiple logistic regression for case-control GWAS. SAIKAT BANERJEE, LINGYAO ZENG, HERIBERT SCHUNKERT AND JOHANNES SÖDING. *PLOS Genetics*, DOI:10.1371/journal.pgen.1007856 (2018)
-  Study of distance dependence of hydrophobic force between two graphene-like walls and a signature of pressure induced structure formation in the confined water. TUHIN SAMANTA, RAJIB BISWAS, SAIKAT BANERJEE AND BIMAN BAGCHI. *The Journal of Chemical Physics*, **149**, 044502 (2018)
-  Orientational order as the origin of the long-range hydrophobic effect. SAIKAT BANERJEE, RAKESH S. SINGH AND BIMAN BAGCHI. *The Journal of Chemical Physics*, **142**, 134505 (2015)
-  Composition dependent non-ideality in aqueous binary mixtures as a signature of avoided spinodal decomposition. SARMISTHA SARKAR, SAIKAT BANERJEE, SUSMITA ROY, RIKHIA GHOSH, PARTHA PRATIM RAY AND BIMAN BAGCHI. *Journal of Chemical Sciences*, 127:49 (2015) **[Cover Article]**
-  Sensitivity of polarization fluctuations to the nature of protein-water interactions: Study of biological water in four different protein-water systems. RIKHIA GHOSH, SAIKAT BANERJEE, MILAN HAZRA, SUSMITA ROY AND BIMAN BAGCHI. *The Journal of Chemical Physics*, **141**, 22D531 (2014)
-  Spatio-temporal correlations in aqueous systems: Computational studies of static and dynamic heterogeneity by 2D-IR spectroscopy. BIMAN BAGCHI, RIKHIA GHOSH, TUHIN SAMANTA, SAIKAT BANERJEE AND RAJIB BISWAS. *Faraday Discussions*, **FD177**, DOI:10.1039/C4FD00201F (2014)
-  Diffusion on a rugged energy landscape with spatial correlation. SAIKAT BANERJEE, RAJIB BISWAS, KAZUHIKO SEKI AND BIMAN BAGCHI. *The Journal of Chemical Physics*, **141**, 124105 (2014)
-  Stability of fluctuating and transient aggregates of amphiphilic solutes in aqueous binary mixtures: Studies of dimethyl sulfoxide, ethanol, and tert-butyl alcohol. SAIKAT BANERJEE AND BIMAN BAGCHI. *The Journal of Chemical Physics*, **139**, 164301 (2013)
-  Fluctuating micro-heterogeneity in water-tert-butyl alcohol mixtures and lambda-type divergence of the mean cluster size with phase transition-like multiple anomalies. SAIKAT BANERJEE, JONATHAN FURTADO AND BIMAN BAGCHI. *The Journal of Chemical Physics*, **140**, 194502 (2014) **[Featured Article]**
-  Structural transformations, composition anomalies and a dramatic collapse of linear polymer chains in dilute ethanol-water mixtures. SAIKAT BANERJEE, RIKHIA GHOSH, AND BIMAN BAGCHI. *The Journal of Physical Chemistry B*, **116**, 3713–3722 (2012)
-  Anomalous behavior of linear hydrocarbon chains in water-DMSO binary mixture at low DMSO concentration. RIKHIA GHOSH, SAIKAT BANERJEE, SUMAN CHAKRABARTY, AND BIMAN BAGCHI. *The Journal of Physical Chemistry B*, **115**, 7612–7620 (2011)
-  Theoretical and computational analysis of static and dynamic anomalies in water-DMSO binary mixture at low DMSO concentrations. SUSMITA ROY, SAIKAT BANERJEE AND BIMAN BAGCHI. *The Journal of Physical Chemistry B*, **115**, 685–692 (2011)
-  Enhanced pair hydrophobicity in the water-dimethyl sulfoxide (DMSO) binary mixture at low DMSO concentrations. SAIKAT BANERJEE, SUSMITA ROY AND BIMAN BAGCHI. *The Journal of Physical Chemistry B*, **114**, 12875–12882 (2010)

## Select Presentations

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### Annual meeting of the International Society for Molecular Biology (ISMB 2019)

BAYESIAN LOGISTIC REGRESSION FOR CASE-CONTROL GWAS

Basel, Switzerland

Jul. 2019

### Advanced seminar for statistical genetics

INVITED BY DR. HENNER SIMIANER, GEORG AUGUST UNIVERSITÄT

Göttingen, Germany

Jan. 2017

## Skills

<b>Programming</b>	Python, FORTRAN, C++, Java
<b>Bioinformatics</b>	GWAS, EQTL, Finemapping, PrediXcan
<b>Molecular Dynamics</b>	LAMMPS, GROMACS
<b>Web</b>	HTML5, CSS, PHP, Node.JS
<b>Languages</b>	Bengali (native), English (fluent), Hindi (fluent), German (basic)
<b>Others</b>	Linux, Bash, $\text{\LaTeX}$ , Git, VMD, Adobe Illustrator, Adobe Photoshop, Inkscape

## Honors & Awards

- 2015 **Best Poster**, Faraday Discussions FD177, Royal Society of Chemistry
- 2009 **Best Poster**, Frontier Meeting in Chemical Biology
- 2007 **Gold Medalist**, 1<sup>st</sup> position in B.Sc. Chemistry Honors at the University of Calcutta
- 2002 **National Merit Scholarship, Govt. of India**, 23<sup>rd</sup> rank in final school examination, West Bengal

## Supervision / Teaching

### Master's Thesis

Göttingen

ANUBHAV KAPHELE, GEORG AUGUST UNIVERSITÄT

2018

- *Thesis title*: Statistical methods to discover trans-eQTLs for better prediction of gene expression from genotype data.
- Anubhav is currently doing PhD with Prof. David Balding.

### Internships

Göttingen, 2017 - 2019

- Identifying novel cardiovascular disease risk loci from UK Biobank (Viola Tozzi).
- 'Reverse' multiple regression on a toy model with correlated variables (Raktim Mitra).
- EQTL analysis of GTEx data (Rahul Nagial).

### Teaching Assistant

Bengaluru, 2011-2013

- Non-equilibrium statistical mechanics: Application to biological systems (for advanced PhD students).
- Statistical mechanics of liquids and simple systems (for new PhD students).

## Extracurricular Activity

### Graphic design and web development, Freelancer

- Curated award-winning logos and created web / brand identity for more than 20 startups.
- Consulted the design and development of the iOS app 'Isle of Miles'.
- Designed two book covers for Oxford University Press.

### Hobbies

- Photography, Hiking, Long distance biking

## References

<b>Dr. Johannes Söding</b>	Max Planck Institute for Biophysical Chemistry, Göttingen. ✉ <a href="mailto:soeding@mpibpc.mpg.de">soeding@mpibpc.mpg.de</a>
<b>Prof. Biman Bagchi</b>	Indian Institute of Science, Bengaluru. ✉ <a href="mailto:profbiman@gmail.com">profbiman@gmail.com</a>
<b>Dr. Suman Chakrabarty</b>	S. N. Bose National Centre for Basic Sciences, Kolkata. ✉ <a href="mailto:sumanc@bose.res.in">sumanc@bose.res.in</a>
<b>Prof. Kazuhiko Seki</b>	AIST, Tsukuba. ✉ <a href="mailto:k-seki@aist.go.jp">k-seki@aist.go.jp</a>