Curriculum Vita

Name: Pulak Kumar Ghosh
Designation: Assistant Professor
Nationality: Indian.

☼ Mailing Address:

Department of Chemistry,
Presidency University, 86/1, College Street, Kolkata – 700073, India

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☼ Work experience:

(i) Assistant Professor, Department of chemistry (December 2013 - present)

(ii) Postdoctoral researcher (September 2013 - November 2013)
iTHES, RIKEN, Wako-Shi, Saitama, 351-0198, Japan

(iii) JSPS Post-doctoral Fellow (September 2011 –August, 2012)
RIKEN, Wakoshi, Japan

(iv) Visiting Scientist (June 2011 – August 2011)
Professor Hänggi's Group
Augsburg University, Augsburg, Germany

(v) Post doctoral Fellow (September 2008 – March 2011)
Digital Materials Laboratory,
RIKEN Advanced Science Institute, 2-1 Hirosawa,
Wako-Shi, Saitama, 351-0198, Japan.
Supervisor: Professor Franco Nori
(Webpage: http://dml.riken.jp/index.php).

(vi) Research Fellow (February 2004 – September 2008)
Department of Physical Chemistry, Theory Group,
Indian Association for the Cultivation of Science,
Jadavpur, Kolkata 700 032, India.
Supervisor: Professor Deb Shankar Ray
(Webpage http://www.iacs.res.in/physchem/pcdsr/).

☼ Education:

- Ph. D (2004-2008)

Jadavpur University, Jadavpur, Kolkata 700 032, India.
Thesis Title: Study of stochastic processes in some model nonlinear systems.
Thesis Supervisor: Professor Deb Shankar Ray

- M. Sc. (2001-2003)
  Department of Chemistry, Visva-Bharti University, Snatinikentan, WB, India
  Specialization: Physical Chemistry
  First Class

- B. Sc. (1998-2001)
  Department of Chemistry, Katwa Collage (Burdwan University),
  Katwa, Burdwan, WB, India
  Honors in Chemistry
  First Class

⌑ Research Interests:

My main research interests are in soft-condensed matter and biophysics. Using methods of quantum and classical statistical mechanics I intend to explore some challenging problems in soft-condensed matter, chemical physics and biophysics. Currently, I am pursuing research in the following areas:

(a) Energy and charge transduction mechanisms in photo-systems
(Exciton, electron and proton transfer processes in both natural and artificial photosystems).
(b) Dynamics of complex systems
(Self-induced aggregation and cluster formation, kinetics of protein folding).
(c) Diffusion mechanisms in confined geometry and active Brownian motion.

⌑ List of Publications

Doctoral publications:

1. *Quantum escape kinetics over a fluctuating barrier,* **P. K. Ghosh**, D. Barik, B. C. Bag and D. S. Ray, J. Chem. Phys. 123, 224104 (2005).

2. *Noise-induced quantum transport,* **P. K. Ghosh**, D. Barik and D. S. Ray, Phys. Rev. E 71, 041107 (2005).

3. *Noise-induced transition in a quantum system,* **P. K. Ghosh**, D. Barik and D. S. Ray, Phys.Lett.A 342, 12 (2005).

4. *Stochastic energetics of quantum transport***, P. K. Ghosh** and D. S. Ray, Phys. Rev. E 73, 036103 (2006).

5. *A parametric variant of resonant activation: two-state model approach,* **P. K. Ghosh** and D. S. Ray, J. Chem. Phys. 125, 124102 (2006).

6. *Inhomogeneous quantum diffusion and decay of a meta-stable state,* **P. K. Ghosh**, D. Barik, and D. S. Ray, Phys. Lett. A 360, 35 (2006).

7. *Langevin dynamics with dichotomous noise: direct simulation and applications,* D. Barik, **P. K. Ghosh** and D. S. Ray, J. Stat. Mech. P03010 (2006).

8. *Interference of stochastic resonances: Splitting of Kramers' rate,* **P. K. Ghosh**, B. C. Bag and D. S. Ray, Phys. Rev. E 75, 032101 (2007).

9. *Noise correlation-induced splitting of Kramers' escape rate from a metastable state,* **P. K. Ghosh,** B. C. Bag and D. S. Ray, J. Chem. Phys. 127, 044510 (2007).

10. *Role of phase difference and colored cross-correlation on current in multiplicative and additive noises driven systems,* G. Goswami, P. Majee, **P. K. Ghosh** and B. C. Bag, Physica A 375, 429 (2007).

11. *Underdamped quantum ratchet,* **P. K. Ghosh** and D. S. Ray, J. Stat. Mech. P03003 (2007).

12. *Colored multiplicative and additive non-Gaussian noise driven dynamical system: mean first passage time,* G. Goswami, P. Majee, **P. K. Ghosh** and B. C. Bag, Physica A 374, 549 (2007).

13. *Quantum Ratchet motion,* **P. K. Ghosh** and D. S. Ray, Journal of the Indian Institute of Science, Vol 87/3 Jul-Sep 2007 (Invited review).

14. *Quantum escape rate from a meta-stable state nonlinearly coupled to a heat bath driven by external colored noise,* **P. K. Ghosh** and J. R. Chaudhuri, J. Stat. Mech.P02014 (2008).

15. *Characterizing phase transition in bistable system using non-equilibrium measurement of work,* **P. K. Ghosh** and D. S. Ray, Physica A 387, 6443 (2008).

16. *Kinetics of self-induced aggregation of Brownian particles non-Markovian and non-Gaussian features,* **P. K. Ghosh**, M. K. Sen, and B. C. Bag, Phys. Rev. E 78, 051103 (2008).

17. *Noise-induced transport in a rough ratchet potential,* D. Mondal, **P. K. Ghosh**, and D. S. Ray, J. Chem. Phys. 130, 074703 (2009).

18. *Kramers-like turnover in load-dependent activated dynamics,* D. Mondal, **P. K. Ghosh**, and D. S. Ray, J. Chem. Phys. 131, 024110 (2009).

Post-doctoral publications:

19. *Modeling light-driven proton pumps in artificial photosynthetic reaction centers,* **P. K. Ghosh**, A. Yu. Smirnov, and F. Nori, J. Chem. Phys. 131, 035102 (2009). Selected as the only "Research Highlight" of that issue of the J.Chem.Phys. Featured in "Riken Research News", Forecasting solar-energy harvests.

20. *High-efficiency energy conversion in a molecular triad,* A. Yu. Smirnov, L. G. Mourokh, **P. K. Ghosh** and F. Nori, J. Phys. Chem. C 113, 21218 (2009).

21. *Geometric stochastic resonance,* **P. K. Ghosh,** F. Marchesoni, S. E. Savel'ev, and F. Nori, Phys. Rev. Lett. 104, 020601 (2010). Featured in "Riken Research News",

22. *Brownian transport in narrow channels subject to transverse pulsation,* **P. K. Ghosh** and F. Marchesoni, Eur. Phys. J. Special Topics 187, 41-47 (2010).

23. Communication: *Driven Brownian Transport in Eccentric Septate Channels,* M. Borromeo, F. Marchesoni and **P. K. Ghosh**, J. Chem. Phys 134, 051101 (2011).

(This paper is among top 20 most downloaded).

24. *Quantum effects in energy and charge transfer in an artificial photosynthetic complex,* **P. K. Ghosh**, A. Yu. Smirnov, and F. Nori, J. Chem. Phys. 134, 244103 (2011). (This paper has been selected for the June 2011 issue of JCP: BioChemical Physics.)

25. *Geometric stochastic resonance in a double cavity,* **P. K. Ghosh**, R. Glavey, F. Marchesoni, S. E. Savel'ev and Franco Nori, Phys. Rev. E 84, 011109 (2011).

26. *Periodic force induced stabilization or destabilization of the denature state of a protein,* **P. K. Ghosh**, M. S. Li and B. C. Bag, J. Chem. Phys. **135**, 114101 (2011).

27. *Artificial photosynthetic reaction centers coupled to light-harvesting antennas,* **P. K. Ghosh**, A. Yu. Smirnov, and F. Nori, Phys. Rev. E 84, 061138 (2011)

28. *Driven Brownian transport through arrays of symmetric obstacles*, **P. K. Ghosh**, P. Hänggi, F. Marchesoni, S. Martens, F. Nori, L. Schimansky-Geier, and G. Schmid, Phys. Rev. E **85**, 011101 (2012).

29. *Particle transport through deformable pore geometries (letters to the editor/note),* **P. K. Ghosh** and F. Marchesoni. J. Chem. Phys. 136, 116101 (2012).

30. *Detectable inertial effects on Brownian transport through narrow pores*, **P. K. Ghosh**, P. Hänggi, F. Marchesoni, F. Nori, and G. Schmid, Europhys Letts. 98 5002 (2012).

31. *Analytical estimates of free Brownian diffusion in a corrugated narrow channel,* L. Bosi, **P. K. Ghosh** and F.Marchesoni. J. Chem. Phys. 137, 174110 (2012).

32. *Brownian transport in corrugated channels with inertia*, **P. K. Ghosh**, P. Hänggi, F. Marchesoni, F. Nori, and G. Schmid, Phys.Rev.E. **86**, 021112 (2012).

33. *Self-propelled Janus particles in a ratchet: Numerical simulations,* **P. K. Ghosh**, V. R. Misko , F. Marchesoni and F. Nori, Phys. Rev. Lett 110, 268301 (2013).

34. Communication: Escape kinetics of self-propelled Janus particles from a cavity: Numerical simulations, P. K. **Ghosh,** J. Chem. Phys 141, 061102 (2014).

35. Active Brownian motion in a narrow channel, X. Ao, **P. K. Ghosh,** Y. Li, G. Schmid, P. Hänggi and F. Marchesoni, Eur. Phys. J. Special Topics 223, 1-16 (2014).

36. Giant negative mobility of Janus particles in a corrugated channel, **P. K. Ghosh**, P. Hänggi, F. Marchesoni and F. Nori, Phys. Rev. E 89, 062115 (2014).

37. Manipulating chiral microswimmers in a channel, Y. Li, **P. K. Ghosh**, F. Marchesoni and B. Li, Phys. Rev. E 90, 062301 (2014).

☼ Conferences/Schools attended/Poster Presentations/Talks:

B. Oral Presentations

- Seaker: Raman center for Atomic, Molecular and Optical sciences, Indian Association for the Cultivation of Science, Jadavpur, Kolkata, India, Date: 19th September, 2007.

Title of talk: *Stochastic resonance, resonant activation and their interference effects*

- Speaker: Symposium on Quantum effects in condensed matter physics, RIKEN, Wakoshi, Japan. Dated: October 13-16, 2009,
  Title of talk: *Solar energy conversion mimicking natural photosynthesis: Modeling the light-energy conversion in a molecular triad (inserted between two proton reservoirs or two electrodes).*

- Speaker: Department of Chemistry, Visva-Bharati, Santinikentan, India, Date: 23th November, 2009.
  Title of talk: *Mimicking natural photosynthesis.*

- Speaker: Department of Physical Chemistry, Indian Association for the Cultivation of Science, Jadavpur, Kolkata, India, Date: 20th November, 2009.
  Title of talk: *Solar energy conversion mimicking natural photosynthesis: Modeling the light-energy conversion in a molecular triad (inserted between two proton reservoirs or two electrode).*

- Speaker: IIIT, Hyderbad, Gachibowli 500032 India, Date 9th December, 2011 .
  Title of talk: *Electronic excitation and charge transfer processes in an artificial antenna-reaction center complex.*

- Speaker: National Chemical Laboratory, Pune, Maharastra, India, Date: 2nd January, 2012.
  Title of talk: *Quantum effects in electronic excitation and charge transfer processes in an artificial antenna-reaction center complex.*

- Speaker: Raman Research Institute, Bangalore, India, On 6th August, 2012.
  Title of talk: *Charge and energy transfer mechanism in an artificial antenna-reaction center complex.*

- Speaker: Indian Institute of Science Education and Research, Mohali, India, On 8th August, 2012.
  Title of talk: *Quantum dynamics in charge and energy transfer mechanism in an artificial antenna-reaction center complex.*

- Speaker: Symposium on quantum simulation at IISc, Bangalore, September 2-3, 2013.
  Title of talk: *Quantum effect in charge and energy transfer mechanism in photosynthesis.*

C. Poster Presentations

- Poster presentation in "National Symposium on Theoretical Chemistry ", 9-12 December 2004, Bhaba Atomic Research Centre, Mumbai, India.
  Poster title: *Noise-induced quantum transport.*

- Poster presentation in "Opening Symposium of QS2C Theory Forum", Sep. 27-30, 2010, RIKEN, Wakoshi, Japan.
  Poster title: *Modeling the light-energy conversion in a molecular triad (inserted between two proton reservoirs or two electrodes).*

- Poster presentation in "The Principle and Applications of Control in Quantum Systems", Sep. 10-13, 2012, Tokyo University, Tokyo, Japan. Poster title: *Quantum effects in energy and charge transfer in a wheel-shaped artificial photosynthetic complex.*

⌑ Computing skills and simulation experiences

Programming Languages: FORTRAN 77/90/95, Matlab.
Operating System: MS Windows, Linux/Unix.
Numerical simulation techniques:

(a) Stochastic Runge-Kutta method.
(b) Stochastic Simulation Algorithm for Dichotomous Noise.
(c) Velocity form of Verlet algorithm for simulation of protein folding kinetics.

⌑ Honours:

- JSPS Fellowship, 2011
- Senior Research Fellowship awarded by Council of Scientific and Industrial Research, 2006.
- Junior Research Fellowship and Eligibility for lectureship awarded by Council of Scientific 2003.

⌑ Professional responsibilities

I have experiences for reviewing scientific research papers. To be specific, I frequently receive invitation for the same from the following journals:

(1) Journal of Chemical Physics
(2) Journal of Physical Chemistry B
(3) European Physical Journal B
(4) Physica A
(5) Journal Statistical Mechanics
(6) Journal of statistical Mechanics: theory and experiment
(7) Applied Physics Letters

⌑ References

(a) Professor Franco Nori
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