Preface

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Abstract. A series of international conferences on Statistical Physics, going by the name Statphys-Kolkata, have been organized in Kolkata (erstwhile Calcutta) at regular intervals of two-three years, the first one being held in 1992-93. The eighth of this series, Statphys-Kolkata VIII (http://newweb.bose.res.in/Conferences/STATPHYSKOLKATAVIII/) was held during December 1-5, 2014, at the Satyendra Nath Bose National Centre for Basic Sciences, Kolkata. This volume contains selected papers\(^1\) by the speakers and participants of the Conference.

1. Introduction
Statistical physics, which deals with understanding macroscopic properties of many-particle systems, encompasses a vast field of research in all fundamental branches of science. It is widely taught as a core subject of undergraduate level courses in physics, since it has become central for the understanding of the other specialized branches of physics. Interestingly, over the last few decades, standard techniques and tools of statistical physics have been applied to topics such as opinion dynamics, voter models, distribution of wealth in a population, minority games, stock-market analysis, socio-economic networks, etc., in the domain of social sciences, far away from the conventional domains of physics. As a result, various intimate connections across the disciplines have emerged.

\(^1\) See peer review statement: All papers published in this volume of Journal of Physics: Conference Series have been peer reviewed through processes administered by the proceedings Editors. Reviews were conducted by expert referees to the professional and scientific standards expected of a proceedings journal published by IOP Publishing.
The purpose of this conference was to bring together leading researchers, young scientists and students who have been working in different disciplines of science and have been primarily using statistical physics techniques for their research. The choice of the subjects and problems that were covered in the conference reflected precisely this multidisciplinary statistical physics approach to understanding collective phenomena in general, where complete theoretical understanding is still lacking. This conference was held to encourage collaboration among researchers belonging to different communities, binding together theoretical, numerical and experimental expertise.

In Statphys-Kolkata VIII, the themes:

- Fluctuation Relations away from Equilibrium,
- Structure and Pattern Formation in Non-equilibrium Systems,
- Interaction and Transport in Biological Systems,
- Co-operative Dynamics in Socio-economical Systems, and
- Statistical Inference, Spin Glass and Data Driven Modeling,

were given special emphasis, while various other issues of Statistical Physics were also addressed. We were glad to note that the conference did attract a large number of young participants, and the talks and poster presentations generated a lot of discussion, interaction and collaboration. The articles appearing in this proceedings are based on the invited talks and a few selected poster presentations.

The group photo taken at the conference is shown in Figure 1.

![Group photo at the conference.](image)

One plenary session was dedicated to felicitate the 60th birthday of Prof. Hidetoshi Nishimori, Tokyo Institute of Technology, Japan, a distinguished statistical physicist and our beloved colleague. He is reputed for his contributions in the areas of spin glasses, information processing,
quantum annealing, etc. with many books, research articles and publications. Figure 2 shows a photo of the felicitation ceremony.

**Figure 2.** The felicitation of Prof. Hidetoshi Nishimori (Tokyo Institute of Technology) on his 60th birthday, by Prof. Bikas K. Chakrabarti (SINP) and the research scholars of SNBNCBS.

It came as a rude shock as we learnt that Dr. Jun-ichi Inoue, had suddenly passed away on May 17, 2015. It was in his office in July, 2013, that the idea of organizing the Statphys-Kolkata VIII meeting was conceived. He was one of the convenors of the meeting, as well as one of the editors of this proceedings volume. We dedicate this volume in his memory!

Figure 3 shows the ever cheerful and dedicated scientist, Dr Jun-ichi Inoue, at the inaugural session of the Statphys-Kolkata VIII conference. We reproduce below some of the remarks as tribute to Dr. Inoue, made by his supervisor, colleagues and collaborators:

“Jun-ichi did his thesis work under my supervision. He was one of the most energetic and talented (or rather, he was THE most energetic and talented) student I ever supervised. He proposed and solved problems after problems week by week, and I had no other choice than to try my best to follow his explosion of ideas and computations. His enthusiasm and devotion to physics should have continued to the last day of his life. I am so proud to call him my former student and colleague. He will never be extinguished from our minds.”

– Prof. Hidetoshi Nishimori, Tokyo Institute of Technology, Tokyo, Japan

“Jun-ichi Inoue first contacted us in 1999-2000 after obtaining his Ph. D. degree in 1998 from the Tokyo Institute of Technology, where his thesis supervisor was Prof. Hidetoshi Nishimori. He had expressed his interest in collaborative research on quantum phase transitions and other current topics in statistical mechanics. He had first visited us during March 2003, in connection with an international conference on Unconventional Applications of Statistical Physics, held in Saha Institute..."
Late Dr. Jun-ichi Inoue, convening the inaugural session of the conference at the S. N. Bose auditorium.

He was then already a faculty member of the Hokkaido University and invited us to visit him in his University. Since then, most of us in our group had visited him several times in Hokkaido (usually with full financial support from his own research fund). I believe, in the last ten years, he visited us in Kolkata more than fourteen times. Recently he had a frequency of visiting us almost twice a year!

Jun-ichi was prolific in calculations and Monte Carlo computations. In general, he was interested in memory models, quantum glasses and econophysics. He had also personal interest in J. C. Bose’s electro-physiological model of plant responses and visited several times the J. C. Bose museum (courtesy Prof. Indrani Bose) of the Bose Institute, Kolkata. I had the good fortune to have collaborated with him in several fields and publish seven papers and one book (Quantum Ising Phases and Transitions in Transverse Ising Models, S. Suzuki, J.-I. Inoue & B. K. Chakrabarti, Springer, Heidelberg (2013)). There is even a contract with the Cambridge University Press for a book on Quantum Spin Glasses & Annealing, with Jun-ichi as one of the co-authors!

Jun-ichi showed remarkable passion for collaborative researches with us in India, the history of which he had deep and profound interest in. He travelled through various parts of India, with keen interest in the people and their culture. Although he was not a mystique, he once told me of his “supernatural” feelings while sitting on the ghats of Ganges in Benaras.

We are devastated, such an energetic and lively colleague of ours died so young; I understand, he was just about forty-eight years in age! Over the years, he became like my younger brother, ready to discuss on any issue at hand.

Spirit of Jun-ichi will be with us for ever.”

– Bikas K. Chakrabarti, Saha Institute of Nuclear Physics, Kolkata, India
“Jun-ichi remained my friend since 2002. From scientific point of view, what I appreciated most in him was his perseverance and precision that behooves in an earnest bearer of Japanese scientific culture. Jun-Ichi kept himself engaged in the difficult task of refining and perfecting quantum algorithms for practical applications, and was making significant progresses in this field. He was a true gentleman - humble, kind, and friendly. I consider his untimely demise is a deep personal loss for me.”

– Dr. Arnab Das, Indian Association for the Cultivation of Science, Kolkata, India

Many other colleagues shared their condolences and grief – too many to be reproduced here. Truly, we will miss him!

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The proceedings of the past Statphys-Kolkata conferences have appeared in Journal of Physics Conference Series, vol: 297 (2011); Physica A, vol: 384 (2007); Physica A, vol: 346 (2005); Physica A, vol: 318 (2003); Physica A, vol: 270 (1999); Physica A, vol: 224 (1996); and Physica A, vol: 186 (1992).

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