SCIENCE NEWS

INTERNATIONAL SYMPOSIUM ON THEORETICAL PHYSICS
Indian Institute of Science, Bangalore.

An International symposium on Theoretical Physics was held at the Centre for Theoretical Studies, Indian Institute of Science. This was organised to celebrate the Diamond Jubilee of Bose Statistics and the Platinum Jubilee of the Indian Institute of Science, Bangalore during 19 November to 1 December 1984. It was sponsored and supported by the Department of Science and Technology, Government of India. Indian Academy of Sciences, Indian National Science Academy and Indian Institute of Science.

The focal themes of the symposium were: (a) Quantum theory of observation and measurement (b) Symmetry breaking and its application to various branches of physics such as Quantum field theory, condensed matter of physics, unification of the fundamental forces, physics of early universe etc.

Six scientists from abroad and 20 from India gave lectures at the symposium on the above topics. There were 30 participants (most of them young scientists) who attended the symposium.

Prof. J. P. Vigier of France gave 3 lectures on 'Causal nonlocal character of Bose statistics and interpretation of recent quantum measurements'. These experiments were described by Prof. H. Rauch of Vienna, particularly the experimental work on neutron interferometry. Professor De Martini discussed his experimental work dealing with photon interferometry and measurement of zero point fluctuations of the electromagnetic field. These experiments along with those of Aspect on photon correlation connected with Einstein Podolsky Rosen-problem brought to focus some recent developments in the quantum theory of measurement. Prof. Vigier in his talks emphasized his intrepretation wherein the quantum particles have simultaneously the wave and particle aspects. This supports a view developed in the twenties by Einstein and de Broglie and amplified later by David Bohm. The experiments by Prof. Rauch and Martini, according to him, support Einstein-de Broglie hypothesis and are at variance with Copenhagen intrepretation according to which quantum particles show either classical wave or classical particle aspect. This was connected intimately with the nature of the vacuum state. In this connection a paper on superfluid state of particle and antiparticle constituting the vacuum state was presented by Prof. K. P. Sinha. This provides further support to Einstein-de Broglie theory in the sense that they provide a medium in which the quantum particles move. Prof. de Martini of Italy is doing experiments which will attempt to verify the existence of the medium which carries the pilot wave. On the same theme Prof. Sudarshan discussed his approach to quantum measurement problems using a dynamical model for coupling of quantum object and classical apparatus. Dr R. Bhandari also spoke on the same problem. The discussion by Dr M. D. Srinivas on the Entropic formulation of uncertainty relations was quite interesting.

Another highlight of the conference was the special lecture by Professor Subramanian Chandrasekhar (Nobel Laureate) on the Gravitational collapse and singularity in general relativity.

On the second theme there were many lectures on the symmetry breaking and their various ramifications. Prof. G. Morandi discussed spontaneously broken symmetries in quantum many body systems. Professors Marmo, S. P. Mishra and A. N. Maheshwari discussed Kaluza-Klein theories and gravity induced weak symmetry breaking in super gravity. Prof. G. Rajasekharan discussed color symmetry breaking; Profs. S. N. Biswas and T. Pradhan lectured on gauge models and measurement of quantities through gauge fields. Dr Haridass gave a talk on gauge theories on lattice, a field which is rapidly developing. Prof. A. P. Balachandran discussed his recent work on nucleon as a soliton wherein they extended the work of Skyrme suggested about 20 years ago. There were other talks on symmetry breaking in condensed matter physics which involved broken symmetry approach to liquid solid transition and crystalline solid (Prof. T. V. Ramakrishnan), broken symmetry in Antiferro-magnets (Prof. C. K. Majumdar), Solitons in supersymmetric field theories (Dr R. K. Kaul). Regarding symmetry breaking and early universe, a talk by Prof. K. P. Sinha (symmetry breaking and phase transition and gravity) highlighted their recent work wherein, above a critical temperature, gravity becomes repulsive. This shows how the

universe might have started after a big bang caused by the repulsive gravity. This provided a reasonable framework of big bang models.

Other talks which were of mathematical interest, involved the group manifold approach by Prof. T. Regge, Group Theoretical Methods in optics by Prof. N. Mukunda, Survey of Boson Stochastic calculus by Prof. K. R. Parthasarathy. Other topics concerned were Quantum first passage problems and blocking of evolution by repeated observations (Prof. N. Kumar), Bose-Einstein condensation in spin-polarized hydrogen (Dr K. N. Shrivastava). Quantum Mechanical Tunnelling (Dr D. K. Roy), sub-natural line-widths in a radiation matter interaction (Prof. G. S. Agarwal), scaling phenomenon in small divisor problems (Dr Rahul Pandit).

A high standard was maintained throughout the symposium and the lectures were followed by useful discussions.

In addition to these, there were 7 evening lectures on the life and work of outstanding Indian Scientists listed below.

Speakers	*Scientists*
Profs.	
E. C. G. Sudarshan	S. N. Bose
B. Buti	P. L. Bhatnagar
J. C. Bhattacharyya	M. N. Saha
P. M. Mathews	H. J. Bhabha
V. S. R. Rao	G. N. Ramachandran
M. S. Narasimhan	Harish Chandra
S. Ramaseshan	C. V. Raman

The lectures served a very important role in highlighting the work of outstanding Indian scientists to a general audience.

The proceedings of the symposium will be published shortly.

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FORM IV

Particulars of *Current Science*—The Fortnightly Journal of Research in Science, India—as per form IV under Rule 8 of the Registration of Newspapers (Central) 1956.

1. Place of Publication: Bangalore
2. Periodicity of Publication: 5th and 20th of each month
3. Printer's Name and Address: M. R. A. Rao, Current Science Association, Bangalore
4. Publisher's Name, Nationality and Address: Prof. M. R. A. Rao, Indian, Current Science Association, Bangalore 560 080.
5. Editor's Name, Nationality and address: Prof. M. R. A. Rao, Indian, Current Science Association, Bangalore 560 080.
6. Name and Address of the Individual who owns the paper: Current Science Association, Bangalore 560 080.

I, Prof. M. R. A. Rao, hereby declare that the particulars given above are true to the best of my knowledge and belief.

Bangalore
March 5, 1985

(Sd/–) Prof. M. R. A. Rao
Publisher, *Current Science*

Edited and Published by Prof. M. R. A. Rao, Current Science Association, Bangalore 560 080
Phototypeset by Macmillan India Ltd., Bangalore 560 025 and
Printed at Macmillan India Press, Madras 600 041.