

Additional notes for the lecture "Bose and the Physical World" at Raman Research Institute, July, 1974.

National celebration of a technical scientific work done 50 years ago. It is good of us to celebrate, but what are we celebrating? What is its importance? How come a technical item acquires so much significance. A felicitous parallel to this phenomenon is in nārāyaṇīyam: I (i) :

sāndrāndāva bodhāt makamanupamitāni . . . .

This is why despite presence of people like Professors Mahadeva Dutta and Nag Chaudhuri I venture to speak of Satyan Bose and the Physical World.

To put the Bose revolution instigated by this gentle, charming, yet leonine seer, let us look back. Mechanics the most materialistic discipline lost its control on the material world in a proxy fight: the conservation laws. The great triumph of mechanics showed up the great importance of conserved quantities, particularly energy. And then came along thermodynamics, which was directly concerned with the manifestations and transformations of energy.

Gita XV

yadādityaḡatam tejo jagat bhasayate' khilāni  
yatcandramsi yacchagnau tattejo viddhi māmakaṃ

So the natural extrapolation is just energy by itself in a cavity. Cavity radiation. Apply laws of thermodynamics. tejas as the light in cavity. Blackbody radiation. Problems. Failure of classical theory. Planck's quantum hypotheses. Quanta. The Planck spectrum. Clean break with classical theory.

Photons as particles. Photoelectric effect. Einstein. Photoelectrons. Compton(?) scattering. Beams of particles.

INSERT RADIO TALK MATERIAL

Two pictures: reconciling them.

ഒന്നായ നിന്നെ ഖിചി രണ്ടു ന്ൻ തിങ്ങൂവെ  
പുണ്യം, ഖോരി ങ്കൽ ഖേത തുണ്ടുവതല്ല മമ  
ചങ്ങേ തുണ തേ വരുവാൻ നമുക്കിനി നിൻ  
തൃപ, വലിതളുണ്ടാക ഖേതഖിചി, നാരായണായ നമഃ

Old Boltzmann method: problems. Why (??) photodistribution. Visvarūpa of the statistical system. Surrealistic ensemble.

Identity and indistinguishability. New counting rule.

Immediate consequences. Photocount distribution (Mehta) Photon bunching Hanbury-Brown Twiss effect.

Einstein's extension. Chemical potential; finite mass quanta.

Bose-Einstein Statistics.

Positive distance correlation. (Bhatnagar-Singwi); non-ideal behaviour 2nd visual concept and non-ideal behaviour (Kothari-Singh). Bose-Einstein consideration. Superfluid with no viscosity. Superconductivity.

Synthesis and the paramountcy of the field. Quanta as simply modifications of the states.

Gita XIII

kṣetrajñam cāpi mām viddhi  
sarvakṣetreṣu bhārata!  
kṣetra kṣetrajñayor jñānam  
yattat jñānam matam mama

The completion of the QFT for the EM field.

Bose and Fermi statistics. Spin and statistics relation.

Dynamical processes and radiation equilibrium. Bose's second paper. (Boltzmann equation) General theory.

A & B coefficients.

Birth and death processes. Movie (Bingo Gautam)

Bose the Master. His vast influence. Clarity of vision. One-pointed study

കൃ,ർ ക്ഷെത്രജ്ഞം, ഞാനു ക്ഷെത്രജ്ഞം യോഗം  
കൃഷ്ണ, ലമിഷ, ഞാനു കൃഷ്ണം യോഗം  
കൃഷ്ണൻ യോഗം യോഗം യോഗം യോഗം  
നിഷ്ണാനം ~~യോഗം~~ യോഗം യോഗം യോഗം

Involvement in the life of the nation. The rishī as the seer. dvā suparna

sayūja sakhāyā - The teacher. a gre kṛtvā kimapi carane ....  
yatra yogīśvara kṛṣṇo yatra pārtho dhanurdhara ....

The study of light