Mathematics Colloquium

Professor Elliott Lieb, Princeton University
Wednesday 2nd of June, 4-5 pm, Room 144 Huxley Building

Title: Mathematics of the Bose Gas: A truly quantum-mechanical many-body problem

- Abstract:
The peculiar quantum-mechanical properties of the lowest energy states of Bose gases that were predicted in the early days of quantum-mechanics have finally been verified experimentally recently. The mathematical derivation of these properties from Schroedinger's equation has also been difficult, but much progress has been made in the last few years and some of this will be reviewed in this talk. For the low density gas with finite range interactions these properties include the leading order terms for the lowest state energy, the validity of the Gross-Pitaevskii equation in traps (including rapidly rotating traps), Bose-Einstein condensationand superfluidity, and the transition from 3-dimensional behavior to 1-dimensional behavior as the cross-section of the trap decreases. The phenomena described are highly quantum-mechanical, without a classical physics explanation, and it is very satisfying that reality and these mathematical predictions agree.

Wine and Canapés reception afterwards in the Huxley Common Room, Level 5, Huxley Building, Please register with Anne Rowlands (a.rowlands@imperial.ac.uk)