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The Early History of Quantum Entanglement

Tuesday 28 August 2007 09:00 (45 minutes)

This talk traces the history of quantum entanglement from Einstein's
earliest worries in 1905-at the time of the photon hypothesis paper-about
the failure of the mutual independence of quanta outside of the Wien
regime, through his early speculations ca. 1909 about wave-particle duality
and his first clear and deep insight into the mutual dependence of systems
obeying bosonic statistics in 1924 to the emergence of entanglement as a
generic feature of the quantum mechanical formalism as well as the deep
physical basis of Bohr's complementarity interpretation ca. 1927 and its
eventual baptism, under the name, "entanglement," by Schrödinger in 1935.
Discussed along the way will be the early speculations about entanglement's
possible role in explaining phenomena such as the Ramsauer effect and its
early employment in the late 1920s and early 1930s in quantum chemistry,
superconductivity, and quantum field theory. A major thesis of the talk is
that by 1927 the central place of entanglement in quantum mechanics was
well understood and widely appreciated, Schrödinger's role in naming
entanglement in 1935 being, therefore, merely to say more explicitly and
for a wider audience what was already by then more or less commonplace
physics from the point of view of the mainstream physics community of that
era. A major question posed implicitly by the paper is why, in view of this
history and in view of continuing work on entanglement by members of the
foundations of physics community, it has only been with the recent rise of
interest in entanglement among physicists working in quantum information
theory, quantum computing, and quantum cryptography that the topic has
seemed, finally, to have re-emerged as being of central importance in the
eyes of the mainstream contemporary physics community.

Presenter: Prof. HOWARD, Don (Univ. of Notre Dame, USA)

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