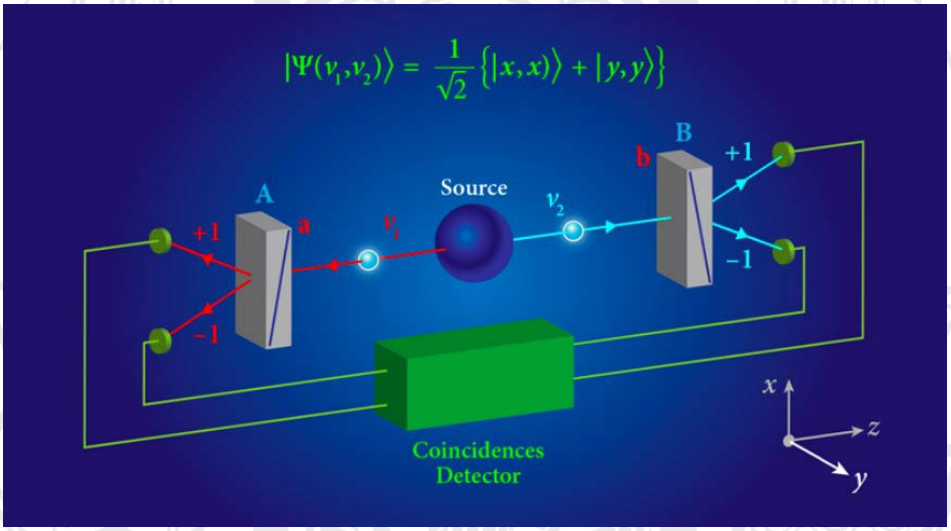
PHYSIKALISCHES KOLLOQUIUM

AM 2. MAI 2022

VON 17 UHR C.T. – 18 UHR 30

IM GROßEN HÖRSAAL, MIT ANSCHLIEßENDER DISKUSSION

FROM EINSTEIN'S QUESTIONS TO ENTANGLED QUBITS: THE SECOND QUANTUM REVOLUTION



ALAIN ASPECT

INSTITUT D'OPTIQUE

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In 1935, with co-authors Podolsky and Rosen, Einstein discovered a weird quantum situation, in which particles in a pair are so strongly correlated that Schrödinger called them “entangled”. By analyzing that situation, Einstein concluded that the quantum formalism is incomplete. Niels Bohr immediately opposed that conclusion, and the debate lasted until the death of these two giants of physics.
In 1964, John Bell discovered that it is possible to settle the debate experimentally, by testing the now celebrated "Bell's inequalities", and to show directly that the revolutionary concept of entanglement is indeed a reality. A long series of experiments, started in 1972, yielded more and more precise results, in situations closer and closer to the ideal theoretical scheme.
After explaining the debate, and describing some experiments, I will also show how this conceptual discussion has prompted the emergence of the new field of quantum information and quantum technologies.

To know more on Bell tests:
A. Aspect, Physics 8,123 (2015), Closing the Door on Einstein and Bohr's Quantum Debate.
A. Aspect, Nature 398,189 (1999), Bell's Inequality Test: More Ideal Than Ever.