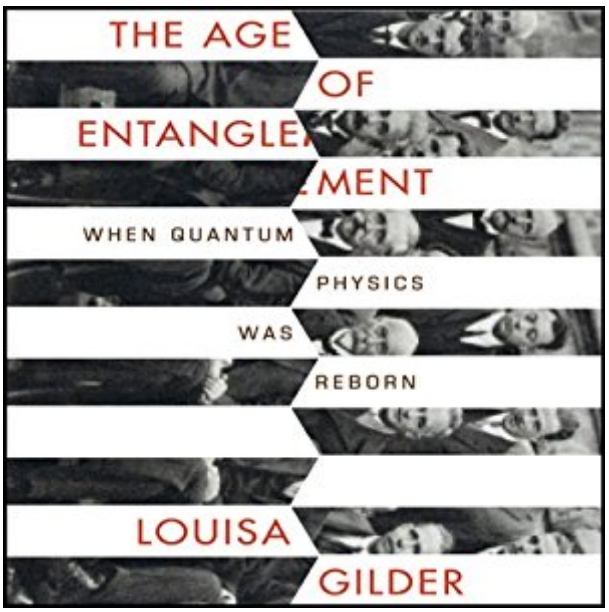
The Age Of Entanglement: When Quantum Physics Was Reborn



Synopsis

A brilliantly original and richly illuminating exploration of entanglement, the seemingly telepathic communication between two separated particlesÃ¢â ¬â •one of the fundamental concepts of quantum physics.In 1935, in what would become the most cited of all of his papers, Albert Einstein showed that quantum mechanics predicted such a correlation, which he dubbed Ã¢â ¬Å“spooky action at a distance.Ã¢â ¬Â• In that same year, Erwin SchrÃƒÂ¶dinger christened this spooky correlation Ã¢â ¬Å“entanglement.Ã¢â ¬Â• Yet its existence wasnÃ¢â ¬â„¢t firmly established until 1964, in a groundbreaking paper by the Irish physicist John Bell. What happened during those years and what has happened since to refine the understanding of this phenomenon is the fascinating story told here.We move from a coffee shop in Zurich, where Einstein and Max von Laue discuss the madness of quantum theory, to a bar in Brazil, as David Bohm and Richard Feynman chat over cervejas. We travel to the campuses of American universitiesÃ¢â ¬â •from J. Robert OppenheimerÃ¢â ¬â„¢s Berkeley to the Princeton of Einstein and Bohm to BellÃ¢â ¬â„¢s Stanford sabbaticalÃ¢â ¬â •and we visit centers of European physics: Copenhagen, home to BohrÃ¢â ¬â„¢s famous institute, and Munich, where Werner Heisenberg and Wolfgang Pauli picnic on cheese and heady discussions of electron orbits.Drawing on the papers, letters, and memoirs of the twentieth centuryÃ¢â ¬â„¢s greatest physicists, Louisa Gilder both humanizes and dramatizes the story by employing their own words in imagined face-to-face dialogues. Here are Bohr and Einstein clashing, and Heisenberg and Pauli deciding which mysteries to pursue. We see SchrÃƒÂ¶dinger and Louis de Broglie pave the way for Bell, whose work is here given a long-overdue revisiting. And with his characteristic matter-of-fact eloquence, Richard Feynman challenges his contemporaries to make something of this entanglement. --This text refers to an out of print or unavailable edition of this title.

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Customer Reviews

Very interesting, entertaining, thought provoking, and informative.I have 2 copies.....one for home, and one to read in the checkout line, orwhen waiting for my wife at Michael's craft store, etc. Works great!I bought it because it was recommended at the Physics Forums (Quantum Mechanics),to help understand Entanglement at a distance.But it's been much more than that to give me a sense of the history and evolution ofQuantum theory, and the great minds that discovered the field.I will need to read it several times at least.

The author tells story of entanglement from a historical perspective, and it's a story well worth reading. The hero of this story isJohn Bell (1928-1990), a remarkable scientist who spent most of his career at CERN. He is best known for the theorem that has been a thorn in the side of quantum mechanics since its publication in 1964. In considering the famous Einstein-Podolsky-Rosen (EPR) paradox, Bell came up with a theorem, stating in effect:Some quantum mechanical predictions (EPR correlations) cannot be mimicked by any local realistic model in the spirit of Einstein's ideas.In a 1978 survey J.F.Clauser and Abner Shimony had summed up the consequences of the theorem:The theorem has thus inspired various experiments, most of which have yielded results in excellent agreement with quantum mechanics, but in disagreement with the family of local realistic theories. Consequently, it can now be asserted with reasonable confidence that either the thesis of realism or that of locality must be abandoned. Either choice will drastically change our concepts of reality and of space-time.Belle's Theorem showed that it was experimentally possible to distinguish between the opposing positions of Bohr (advocate of quantum mechanics) and Einstein (advocate of hidden variables theory). Any local hidden variables theory would lead to results that would satisfy Bell's inequality. Hence, results that violated the inequality would conclusively rule out the hidden variables theory of the sort described by Einstein.Kurt Gottfried and N. David Mermin state that "Bell has had the greatest impact on the interpretation of quantum mechanics of anyone since the 1920s

Gilder's book is an excellent introduction to the entire subject of quantum mechanics as well as to the specific phenomenon of entanglement. Written for the non-scientist, it provides excellent bios of

the scientists who were instrumental in discovering some of the mysteries of particles physics, making their contributions to the subject easy to remember. Although a little short on scientific detail, if the reader is patient enough to read to the end, they'll find that they have gained a lot of insight into this very esoteric subject. It's certainly worth the read. Jim Marsis, Providence

The first ~2/3 of the book is a history of the early development of quantum mechanics and the arguments among its founders over its interpretation. The classic arguments, especially between Einstein and Bohr, are presented in a form that I believe will be understandable to those without a knowledge of the mathematics of Quantum Theory. The author clearly sides with those who opposed the interpretation that came to be known as the Copenhagen Interpretation. The author takes some historical license (which she acknowledges) to present the ideas of the principle characters in an entertaining way. The personalities of the individuals are fleshed out. The last third focuses on Bell's inequality, its experimental tests, and the development of entanglement as a vibrant area of modern physics, now known as quantum information theory. This is the rebirth of the title. I found the discussion of quantum information theory the weakest part of the book -- it was too compressed. If this is your interest, this book will likely not satisfy except in terms of providing historical background.

EXCELLENT...

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