

## **Anton Zeilinger**

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In the 1970s, Anton Zeilinger started his work on the foundations of quantum mechanics with neutron interferometry. These experiments included confirmation of the sign change of a spinor phase upon rotation, precision tests of the linearity of the Schrödinger equation, and many other fundamental tests.

Going beyond single-particle phenomena, Zeilinger became interested in quantum entanglement, where his most significant contribution is the discovery of what is today called “GHZ states” and their experimental realization. These were the first instances of multi-particle entanglement ever investigated. Such states have become essential in fundamental tests of quantum mechanics and in quantum information science.

Since then, Zeilinger has performed many experiments with entangled photons, including quantum teleportation, quantum cryptography, all-optical one-way quantum computation and a number of quantum gates.

In single-particle interference, he has performed a number of experiments in atom interferometry and in quantum interference of large molecules, like C<sub>60</sub> and C<sub>70</sub>. These included very detailed studies of quantum decoherence.

The technological progress in all these fields is making new fundamental tests possible. Most recently, Zeilinger became interested in tests of Leggett-type nonlocal theories and in fundamental phenomena in quantum entanglement of ultracold atoms, to name two examples.

The most important stages in the career of Anton Zeilinger include the Technical University of Vienna, M.I.T., the Technical University of Munich, the University of Innsbruck, the Collège de France, the University of Vienna and the Austrian Academy of Sciences.