

The Nobel Prize in physics

October 7, 2022

In news– The 2022 Nobel Prize in Physics was awarded **for experiments with entangled photons, establishing the violation of Bell inequalities, and pioneering quantum information science.**

About the discovery-

- John Clauser, Alain Aspect, and Anton Zeilinger have received Physics Nobel for their groundbreaking **experiments using entangled quantum states**, where two particles behave like a single unit even when they are separated.
- **Their experiments have conclusively established that the 'entanglement' phenomenon observed in quantum particles was real, not a result of any 'hidden' or unknown forces**, and that it could be utilised to make transformative technological advances in computing, hack-free communications, and science fiction-like concept of 'teleportation'.
- **John Clauser built an apparatus that emitted two entangled photons at a time**, each towards a filter that tested their polarisation. The result was a **clear violation of a Bell inequality** and agreed with the predictions of quantum mechanics.
- **Alain Aspect developed a setup to close an important loophole**. He was **able to switch the measurement settings after an entangled pair had left its source**, so the setting that existed when they were emitted could not affect the result.
- **Anton Zeilinger researched entangled quantum states**. His research group has **demonstrated a phenomenon called quantum teleportation**, which makes it possible to move a quantum state from one particle to one at a distance.
- The 2022 Nobel Prize laureates in physics have **conducted**

groundbreaking experiments using entangled quantum states, where two particles behave like a single unit even when they are separated.

- **In 2021, the academy honoured Syukuro Manabe, of Japan and the United States, and German Klaus Hasselmann for their research on climate models,** while Italian Giorgio Parisi also won for his work on the interplay of disorder and fluctuations in physical systems.
- The Nobel Prize in Physics has been awarded 116 times to 222 Nobel Prize laureates between 1901 and 2022.
- **John Bardeen is the only laureate who has been awarded the Nobel Prize in Physics twice, in 1956 and 1972.**