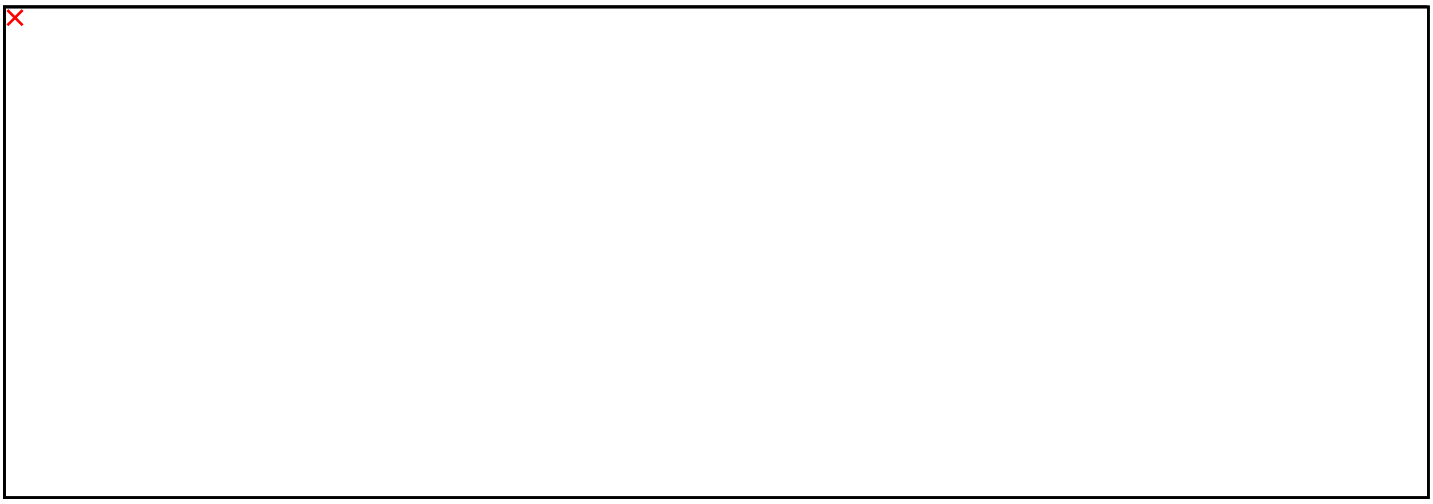
Quantum mechanics – 'Pure Science and not Magic', explaining the concept of entanglement



"Any sufficiently advanced technology is indistinguishable from magic" according to science fiction writer Arthur C. Clarke.

The results created by quantum mechanics are so unfamiliar to humankind that they could be mistaken for magic. To discuss this let's investigate part three of our #Tyndallscifacts series on Quantum – **Quantum entanglement.**

Entanglement occurs when two particles become inextricably linked, and whatever happens to one immediately affects the other, regardless of how far apart in distance they are.

Albert Einstein referred to it as 'spooky action at a distance', nevertheless this year, scientists from Glasgow University of Scotland captured the world's first actual photo of this phenomenon, while many previous experiments confirmed related predictions of quantum physics. Hence the 'spooky action at a distance' description.

Quantum entanglement can find applications in quantum cryptography and quantum computing. By entangling a particle pair, one (typically Alice) can transmit one of the particles to the recipient (typically Bob) and perform a physical operation on the other, so that its state can be instantaneously reflected in Bob's particle.

Alternatively, Alice can perform an operation to her particle (Bell measurement, more on that on our next post) to place it in a state that can be inferred (teleported to) by Bob's particle if Bob has the information about Alice's operation. This can be used in quantum communication.

As a corollary if someone else tries to eavesdrop Alice would immediately know once she operates on her particle, that is, secure communication or quantum cryptography.

Entanglement can also be used for superdense information encoding, that is, to transport two bits of classical information via a single entangled qubit. This property is conjectured to give extra power to quantum computers over their classical counterparts and several groups are set to demonstrate this through quantum algorithms.