

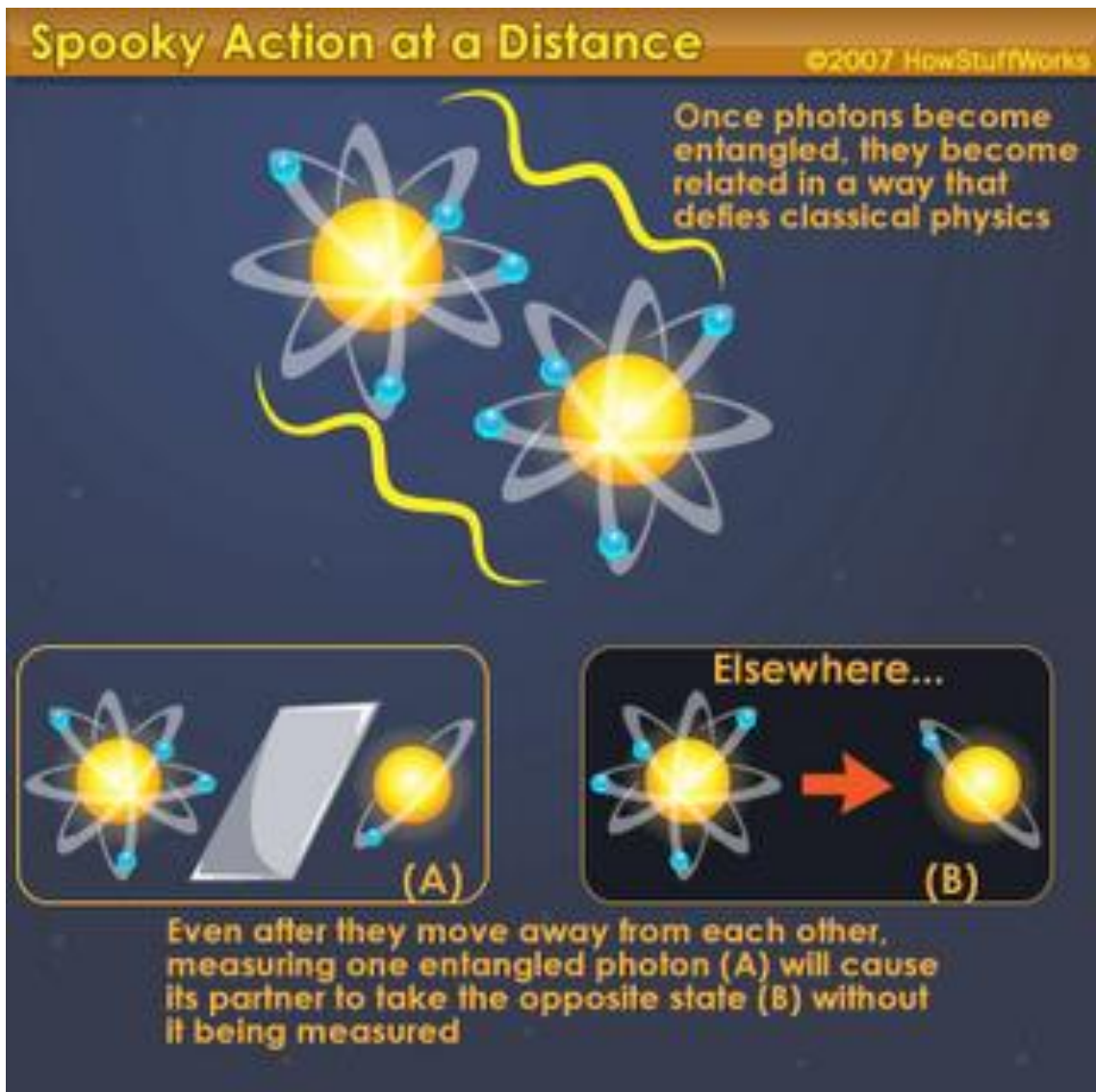
Quantum mechanics may explain how animals migrate across vast distances



Many species use our planet's magnetic field to migrate across vast distances with incredible accuracy. [Monarch butterflies](#) move across the North American continent every season, spending winters in Mexico and California, and spreading throughout the US in summer as they pursue their host plant. Their journey is so long that by the time they reach their winter destination again, the population will be many generations removed from the one that left the previous year. Numerous other birds, insects and mammals accomplish similar feats of navigation every year, and physicists believe that quantum mechanics may lie at the heart of what makes it possible.

A group of Austrian physicists published an article in [Physical Review Letters](#) this month explaining how they could enhance or reduce the performance of an animal's chemical compass using [quantum entanglement](#).

Entanglement describes a quantum mechanical state where two objects are connected in a way that prevents understanding what's happening with one object without acknowledging the other. What's spooky about it is that the objects can be seemingly separated and what affects one, will still affect the other.



When a photon enters an animal's eye, it hits a magnetic receptor which produces a pair of free-radicals. These free-radicals interact with each other, as well as a weak magnetic field, causing a spin that allows the animal to "see" the magnetic field and give it a kind of compass.

The quantum mechanical effects on the system are little understood and the team suspected quantum entanglement might play a role. They found that, theoretically, entanglement should play a role in navigation and could be very helpful for some animals. They also found that in some animals, such as European robins, it shouldn't play a role. The group says that comes from a need for short-lived free-radicals for entanglement to play a prominent role. So it appears there could be a strong relationship (in some animals) between entanglement and an animal's ability to orient itself in a magnetic field.

Whether or not animals are actually using this relationship to migrate, is yet to be proven.