

Beam me up? (Well, maybe one day)

A scientific breakthrough has brought the *Star Trek* dream of teleportation a step closer, reports **Mark Henderson**

THE science fiction world of *Star Trek* has moved closer: scientists in Austria and the United States have successfully “teleported” physical characteristics from one atom to another.

The scientists, using a phenomenon so bizarre that Albert Einstein described it as “spooky”, have trapped information encoded in one atom and transferred it to another.

The breakthrough, however, does not mean that scientists will soon be able to beam matter from one place to another in the fashion of the “transporter” on the starship *Enterprise*.

They have succeeded in teleporting only the “quantum state” of an atom — a description of its critical properties such as energy, motion and magnetic field — rather than the atom itself.

Even were it possible to teleport matter with mass, the process of taking apart the trillions of atoms in the human body and putting them back together again would probably kill the unfortunate traveller.

Sam Braunstein of the University of Wales at Bangor, who was part of the first team

to teleport photons in 1998, has also calculated that it would take approximately ten billion years — not far short of the age of the Universe — to teleport all the atoms in a person over even a short distance.

The latest research, however, has important potential applications in “quantum computing”, in which the ability to transfer data instantly between atoms could transform the speed and processing power of computers.

A quantum computer the size of a sugar lump would be so powerful that it could conduct massively complex calculations that would be impossible at present.

Teleportation relies on the concept of “quantum entanglement”, which Einstein developed and described as “spooky action at a distance”. It means that every particle is paired with another, and the fate of one instantly affects the other.

If one particle is made to take on a certain set of properties, the other will immediately take on either identical or opposite properties, no matter how far away it is.

In one of the experiments,

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Final frontier: Captain Kirk and the crew of the *Enterprise* are transported back to the ship during one of their adventures

details of which are reported today in the journal *Nature*, a team at the US National Institute for Standards and Technology in Boulder, Colorado transferred the

properties of a beryllium ion, which is a charged atom, to another using a laser.

In the other, scientists at the University of Innsbruck in Austria transferred the

properties of an entangled calcium ion.

H.J. Kimble of the California Institute of Technology in Pasadena, California, and S.J. van Enk of Bell Labs in New

Jersey said: “The techniques developed and employed by these groups will no doubt prove important in the quest to build large-scale quantum computers based on trapped ions.”