oncile the quantum mechanical predictions and Einstein's conceptions by invoking a possible exchange of signals between the polarizers. To avoid this loophole, Bell stressed the importance of experiments "in which the settings are changed during the flight of the particles"[1], so that any direct signal exchange between polarizers would be impossible, provided that the choice of orientations is made randomly in a time shorter than the flight time of the particle or photon, to ensure that relativistic separation is enforced.

Prompted by Bell's remark, a first step towards the realization of this ideal scheme[14] found a violation of Bell's inequality with rapidly switched polarizers, but the polarizer separation (12 m) was too small to allow for a truly random resetting of the polarizers. With a separation of 400 m between their measuring stations, the physicists of Innsbruck[4] have 1.3 μs to make random settings of the polarizer and to register the result of the measurement, as well as its exact timing monitored by a local rubidium atomic clock. It is only at the end of the run that the experimentalists gather the two series of data obtained on each side, and look for correlations. The results, in excellent agreement with the quantum mechanical predictions, show an unquestionable violation of Bell's inequalities[4].

This experiment is remarkably close to the ideal *gedanken* experiment, used to discuss the implications of Bell's theorem. Note that there remains another loophole, due to the limited efficiency of the detectors, but this can be closed by a technological advance that seems plausible in the foreseeable future, and so does not correspond to a radical change in the scheme of the experiment. Although such an experiment is highly desirable, we can assume for the sake of argument that the present results will remain unchanged with high-efficiency detectors.

The violation of Bell's inequality, with strict relativistic separation between the chosen measurements, means that it is impossible to maintain the image '*à la* Einstein' where correlations are explained by common properties determined at the common source and subsequently carried along by each photon. We must conclude that an entangled EPR photon pair is a non-separable object; that is, it is impossible to assign individual local properties (local physical reality) to each photon. In some sense, both photons keep in contact through space and time.

It is worth emphasizing that non-separability, which is at the roots of quantum teleportation[15], does not imply the possibility of practical faster-than-light communication. An observer sitting behind a polarizer only sees an apparently random series of − and + results, and single measurements on his side cannot make him aware that the distant operator has suddenly changed the orientation of his polarizer. Should we then conclude that there is nothing remarkable in this experiment? To convince the reader of the contrary, I suggest we take the point of view of an external observer, who collects the data from the two distant stations at the end of the experiment, and compares the two series of results. This is what the Innsbruck team has done. Looking at the data a posteriori, they found that the correlation immediately changed as soon as one of the polarizers was switched, without any delay allowing for signal propagation: this reflects quantum non-separability.

Whether non-separability of EPR pairs is a real problem or not is a difficult question to settle. As Richard Feynman once said[16]: "It has not yet become obvious to me that there is no real problem ... I have entertained myself always by squeezing the difficulty of quantum mechanics into a smaller and smaller place, so as to get more and more worried about this particular item. It seems almost ridiculous that you can squeeze it to a numerical question that one thing is bigger than another. But there you are — it is bigger...". Yes, it is bigger by 30 standard deviations. □

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**Conservation**

# Oryx go back to the brink

**A flagship conservation programme, the Arabian Oryx Project in Oman, has suffered a severe setback because of an illegal trade in live animals sold into private collections. The sad story was recounted by Andrew Spalton, a biologist with the project, at a conference in Abu Dhabi earlier this month.**

**In the early 1960s the Arabian oryx (*Oryx leucoryx*, pictured here) was being hunted to extinction, so a small number were captured to establish breeding herds in the United States and Arabia. The last wild animals were killed in the deserts of Oman in 1972. Ten years later, reintroductions began with the release of ten founder members into Oman's central desert just 75 km from where the last wild oryx had been shot. The liberated oryx flourished, despite serious drought, and by October 1995 there were around 280 animals in the wild, ranging over 16,000 km$^2$ of desert.**

**A few months later the spectre of poaching returned and oryx began to be taken for sale as live animals outside Oman. Nonetheless, the number of animals continued to increase, to 400 or so, until increasing poaching pressure through 1997 and into 1998 led to a population crash to just 138 in September of last year. At that point the wild population was considered to be no longer viable and 40 animals were taken back into captivity. After further poaching in January of this year, just 11 females and an estimated 85 males remain in the wild.**

MARTYN GORMAN

**There is a further reintroduction programme in Saudi Arabia, where poaching is currently less of a threat. So the outlook for oryx in the wild is not entirely grim. But in Oman the situation is bleak, and political action will be needed to remedy matters.**

**Martyn Gorman**

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