



50 YEARS AGO

The largest and heaviest satellite so far placed in orbit by the United States was launched in a south-easterly direction from Cape Canaveral in Florida at 23.02 u.t. on December 18. The complete satellite weighs some 8,500 lb., of which only a small proportion, about 150 lb., is pay-load. The remainder of the object is the empty shell of the *Atlas* missile which performed the launching, about 80 ft. long and 10 ft. in diameter. The main purpose of the satellite is to act as a radio relay station, storing and re-transmitting, on frequencies of 132.45 and 139.905 Mc./s., messages sent to it from the ground. It also carries telemetry transmitters operating on 107.97 and 107.94 Mc./s. The satellite is the first to be successfully launched since July 1958, and is designated 1958ζ.

From *Nature* 3 January 1959.

100 YEARS AGO

Fads and Feeding. By Dr. C. Stanford Read — This is an admirably clear, well reasoned, and sensible little book. One can only hope that it may be widely read and may do something to counteract the ridiculous views on diet which are the result of the cogitation of that dangerous class of people who, having a little knowledge, supply the remainder from their own imagination. In spite of the importance of a suitable diet for health, there is perhaps no other subject which breeds so many fads ... The key-word of Dr. Read's book is moderation; moderation in meat-eating, in tea-drinking, in the use of alcoholic drinks and the like. He is also moderate in the way he deals with the faddists, the vegetarians, the uric-acid-free dietists, the teetotalers, and the rest. Perhaps this method of dealing with them is the most effectual with the public, who, taken as a whole, are moderate, and temperate too.

From *Nature* 31 December 1908.

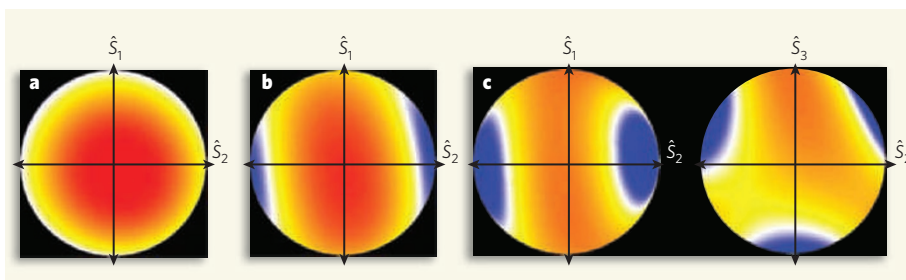


Figure 2 | Squeezing a triphoton. The position of the quantum state on the surface of a sphere — seen here in two-dimensional projections — describes the polarization of a three-photon (triphoton) state. The directions \hat{S}_1 , \hat{S}_2 and \hat{S}_3 represent the degree of horizontal, 45° and right-circular polarizations, respectively. The colours correspond to different levels of probability for the polarization state (red for highest probability, blue for lowest); the red and yellow regions represent the quantum uncertainty blob. The uncertainty in the \hat{S}_2 direction is reduced as the squeezing is increased (a–c). **a**, An unsqueezed state. **b**, As the squeezing is increased, the uncertainty in the \hat{S}_2 direction is decreased at the expense of increased uncertainty in the \hat{S}_1 direction. **c**, Shalm *et al.*² show that in the over-squeezed case the uncertainty blob completely wraps around the sphere. Although the regions of uncertainty are small in the \hat{S}_2 direction, there are three of them — as shown in an alternative projection (right) — leading to a large overall uncertainty. (Modified from ref. 2.)

the connection between highly entangled states and the squeezing of quantum states by showing the continuum of quantum states with reduced measurement uncertainty. And this idea does not only apply to photons. Recently, similar effects were observed in an atomic spin system⁷. So, are physicists now the masters of quantum uncertainty? Well, not quite. It remains a difficult proposition to highly squeeze large numbers of quantum systems, and a few photons is a long way from the large entangled states required for practical application of quantum-enhanced precision measurement. But our control of the quantum world is always improving, and we may one day see optimum-precision measurements with large ensembles. In the meantime, we can look for applications of those squeezed

and entangled states that can be made^{8–10}. And we can admire the peculiar beauty and symmetries of the quantum world. ■

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CANCER

Inflaming metastasis

Alberto Mantovani

Cancer can be defined by six hallmarks, including uncontrollable growth, immortality and the ability to invade other tissues. Increasing evidence suggests that a seventh feature should make this list — inflammation.

Malignant tumours are characterized by their ability to metastasize, that is, to invade anatomically distant normal tissues and to seed and grow there. During this complex and highly selective process, tumour cells leave their primary site and disseminate by various routes, such as the blood and lymph vessels. Not all cancer cells can metastasize¹, because successful metastasis depends both on intrinsic properties of the tumour cells and on factors derived from the tumour microenvironment. For example, the microenvironment provides blood and lymphatic vessels in and around the

tumour, an inflammatory milieu consisting of immune cells and their secretory products, and a scaffold in the form of the extracellular matrix for further growth. Writing in this issue, Kim *et al.*² shed light on the unexpected molecular pathways that link inflammation in the tumour microenvironment to metastasis (page 102).

The link between inflammation and cancer is well documented^{3,4}. Several inflammatory diseases, including inflammatory bowel disease, increase the risk of cancer. Conversely, in tumours that are epidemiologically unrelated