Anti-hydrogen

1996 seems to be the year in which many experiments for which ultimate skills were required of physicists have fructified. Nellis and his group at Lawrence Livermore have metallized hydrogen (*Curr. Sci.*, 1996, **70**, 876–877); J. E. Baldwin and his group at Combridge (*Astron. Astrophys.*, 1996, **306**, L13–L16) have made an important advance in optical astronomy. The resolving power for optical imaging of stars has improved from 1 arcsec to a few milliarcsec, by the techinque of aperture synthesis; this may now make it possible to observe spots and other features on stars which could only be seen on the sun so far. Now comes the news on internet from CERN that antimatter has been created; specifically that nine atoms of anti-hydrogen have been 'observed'.

In 1898, Arther Schuster the British physicist surmised the existence of antimatter. With Dirac predicting the positron in 1929, Carl Anderson discovering it in 1932, Owen Chamberlin, Emilio Segre and others discovering the antiproton in 1955, it seemed just a matter of time before antihydrogen would be synthesized. Yet one had to wait more than 40 years for this to happen. Big machines like the low energy antiproton ring (LEAR) had to be built in which beams of positrons and antiprotons could be brought together in a cloud of inert xenon gas. The velocities of the antiprotons and the positrons slowed down to be almost the same so that one could capture the other and form a neutral atom.

The temperature too has to be kept below 14 eV (140000 degrees) so that the two component particles do not dissociate. When the antihydrogen atom is formed, being uncharged, it is not bent by the magnetic field of LEAR, and it flies straight to the silicon detector. The experiment has only 'observed' the decay products of the antihydrogen atom, not the atom itself. The ultimate goal of isolating atoms of antimatter for further studies is still to be achieved. When this happens the comparison of the spectroscopy of the anti-protonic atom and the normal hydrogen atom may prove interesting from the point of view of testing weak violations of basic symmetries. The results of another experiment planned by Samuel Ting (of J particle fame) and others of detecting antimatter in space using an anti-matter spectrometer are eagerly awaited by cosmologists.

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The 1996 Crafoord Prize

The Royal Swedish Academy of Sciences has awarded the 1996 Crafoord Prize in the biosciences with particular emphasis on ecology to Sir Robert M. May, University of Oxford, UK, for his pioneering ecological research concerning theoretical analysis of the dynamics of populations, communities and ecosystems. The value of the 1996 Crafoord Prize is US$ 500,000.

Robert M. May, born in 1936 in Sydney, Australia, began his career as a theoretical physicist but has become, over the last twenty-five years, the person who has exerted the greatest influence on theoretical and empirical ecologocal research. Through his pioneering achievements, scientists now have a better understanding of the ecological dynamics of individual populations, the interplay between different species and whole ecosystems. Furthermore, his theoretical research has been of great significance for a number of important practical problems.

May's first great contribution concerned the hotly-debated question of whether stability is the cause of the diversity of ecosystems, or whether it is the other way round. May clarified that biological diversity does not automatically generate stability and that a number of different factors in combination lead to the stability of the ecosystem through various disruptions. May's book *Stability and Complexity in Model Ecosystems* (1974) brought about a drastic change of direction in the way of viewing the interaction between different species and the reaction patterns of the ecosystem. The book stimulated innovative research contributions in a number of different fields.

In the young science of nature conservancy biology, May's population dynamics models and theoretical analyses have come to play a fundamental role. This concerns, above all, mapping out what factors are most important for the survival possibilities of small and fragmented plant or animal populations in an environment that is exploited to an ever-increasing degree by man. Crucially, May's theoretical work has pointed at the significance of random events within the diminishing populations, with regard to their prospects of survival for longer periods.

Robert M. May is a professor at the Department of Zoology at the University of Oxford, England. He is also Chairman of the British government's Advisory Council for Science and Technology.