Physics News Update
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The Physics Story of the Year

The physics story of the year 2006 was, we believe, the new high precision (0.76 parts per trillion uncertainty) measurement of the electron's magnetic moment by Gerald Gabrielse and his colleagues at Harvard University. Then in a second paper the same experimenters used the new moment in tandem with a fresh formulation of quantum electrodynamics (QED) provided by theoretical colleagues to formulate a new value for the fine structure constant (denoted by the letter alpha), the pivotal parameter which sets the overall strength of the electromagnetic force. The new value has an uncertainty of 0.7 parts per billion, the first major revision of alpha in 20 years. A comparison between this new value and values determined by other methods provides the best test yet of quantum electrodynamics (QED) (**PNU 783 (http://www.aip.org/pnu/2006/split/783-1.html)** ; also see Physics Today, Aug 2006).

Other top physics stories for the year, in no particular order, are listed below with links to pertinent PNU items (and sometimes figures) from the past year.

The observation of many more supernovas at redshifts of 1, thus establishing the idea that dark energy was around even in the early universe (**PNU 802 (http://www.aip.org/pnu/2006/split/802-1.html)**)

The first direct measurement of turbulence in space (**PNU 802 (http://www.aip.org/pnu/2006/split/802-2.html)**)

The best direct test of Einstein's $E=mc^2$ formula (**PNU 761 (http://www.aip.org/pnu/2006/split/761-1.html)**)

New WMAP measurements of the cosmic microwave background, including polarization information, help to sharpen cosmological numbers such as the age or the flatness of the universe (**PNU 769 (http://www.aip.org/pnu/2006/split/769-1.html)**)

First matter-antimatter chemistry (**PNU 796 (http://www.aip.org/pnu/2006/split/796-1.html)**)

Elements 116 and 118 (**PNU 797 (http://www.aip.org/pnu/2006/split/797-1.html)**)

The 2006 Nobel prize in physics for John Mather and George Smoot (**PNU 795 (http://www.aip.org/pnu/2006/split/795-1.html)**)

Advances in plasmonics, or "two-dimensional light" (**PNU 770 (http://www.aip.org/pnu/2006/split/770-1.html)**)

Advances in the study of graphene, including the discovery of a new form of the Hall effect (**PNU 769 (http://www.aip.org/pnu/2006/split/769-2.html)**)

Progress at several labs in modeling gravity wave transmissions from black hole mergers, the kinds of events which LIGO or LISA would possibly detect (**PNU 771 (http://www.aip.org/pnu/2006/split/771-1.html)**)

Measuring the presence of virtual strange quarks inside protons (**PNU 776 (http://www.aip.org/pnu/2006/split/776-1.html)**)

Acoustic lasers (**PNU 779 (http://www.aip.org/pnu/2006/split/779-1.html)**)

Evidence for negative electrical resistance (**PNU 780 (http://www.aip.org/pnu/2006/split/780-1.html)**)

A particle laser or "PASER" (**PNU 792** **(http://www.aip.org/pnu/2006/split/792-1.html)**)

Hypersound (**PNU 794 (http://www.aip.org/pnu/2006/split/794-1.html)**)

Heaviest baryons discovered (**PNU 798** **(http://www.aip.org/pnu/2006/split/798-1.html)**)

Investigating whether the electron/proton mass ratio changed over time (**PNU 774 (http://www.aip.org/pnu/2006/split/774-1.html)**)

Optical "cloaking" (*Science*, 8 September; see also two news articles in the **26 May** **(http://www.sciencemag.org/cgi/content/summary/312/5777/1120a)** and in the **20 October** **(http://www.sciencemag.org/cgi/content/summary/314/5798/403)** issue of the magazine)

Telecloning (**PNU 765 (http://www.aip.org/pnu/2006/split/765-1.html)**)

Rare positronium ion (**PNU 763** **(http://www.aip.org/pnu/2006/split/763-1.html)**)

Wireless energy transfer (**PNU 801** **(http://www.aip.org/pnu/2006/split/801-1.html)**)

The sharpest object ever made (**PNU 788** **(http://www.aip.org/pnu/2006/split/788-2.html)**)

Chemical transistor (**PNU 786** **(http://www.aip.org/pnu/2006/split/786-1.html)**)

Radioactive scorpion venom for brain cancer therapy (**PNU 782** **(http://www.aip.org/pnu/2006/split/782-1.html)**)

Liquid flowing uphill (**PNU 772** **(http://www.aip.org/pnu/2006/split/772-1.html)**)

Stock market criticality (**PNU 765** **(http://www.aip.org/pnu/2006/split/765-2.html)**)

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