The Director's Corner

Why Einstein? Why 2005?

As you know, Sigma Pi Sigma is joining with the lead of The International Union of Pure and Applied Physics (IUPAP) and many other physics groups by declaring 2005 the World Year of Physics (WYP 2005) in celebration of Einstein. Even the US Congress and the United Nations have joined in, proclaiming 2005 as the International Year of Physics. No doubt, your background in physics makes you the expert among your friends and acquaintances, so I thought I would help you get ready for the onslaught of questions by providing a summary answer to the titular questions.

Back in high school I read an essay by Isaac Asimov that started out something like this: "Suppose Einstein hadn't discovered relativity; who would then be heralded as the greatest physicist in the 20th century?" Not yet having enrolled in any physics class, I didn't really know much about physicists, modern or otherwise. Other than Einstein and his relativity, who is the next greatest contributor to modern physics?

Consider Marie Curie, with her two Nobel Prizes and exceptional work in understanding radioactivity—is she the one? Or maybe the impressive James Clerk Maxwell, who figured out how light is produced, or J. J. Thomson, who discovered electrons? Alas, as modern-sounding as these seem, most of their work was before the turn of the century.

Who would you choose? What about another two-time Nobel Prize winner, John Bardeen? Since he is the only person ever to get two such awards in physics, for superconductivity and transistors, he seems like a natural choice. Or perhaps you prefer, despite her relative obscurity, the mathematical elegance of someone like Emmy Noether, who discovered one of the deepest connections in science, between nature's symmetries and conservation laws? Or perhaps a particular one of the architects of the new quantum theory—Heisenberg, Dirac, Fermi, Schroedinger, or Bohr—is more appealing to your sensibilities?

Asimov asserted that even without considering relativity, the greatest modern physicist would be (drum roll, please) … Einstein!

Why Einstein, still? Well, in 1905 alone, while employed as a full-time patent clerk and recently married, he wrote five papers in which he is usually credited with:

- ❖ Providing definitive evidence for atoms via his analysis of Brownian motion,
- ❖ Determining the size of molecules in his doctoral dissertation,
- ❖ Extracting evidence of "atoms" of light (later called photons) in his study of the photoelectric effect (see the Elegant Connections article in this issue),
- ❖ Showing that measurements of time and distance are dependent upon relative speed, and
- ❖ Showing that energy and matter can be transformed into each other via the famous equation, $E = mc^2$.

After 1905, Einstein went on to develop several groundbreaking ideas besides his famous, and truly original, work on general relativity (GR), producing the first quantum theory of solids with his model of specific heat, initiating the field of cosmology by applying his GR ideas to a closed universe, and paving the way for the laser with his article on stimulated emission of light. Even by 1921, relativity was still too radical an idea to be mentioned in his Nobel Prize citation, the committee opting to single out his revolutionary ideas about the photoelectric effect instead. Later, he generated landmark works in statistical mechanics of spinless particles (Bose-Einstein statistics and condensates), and in quantum philosophy with the Einstein-Podolsky-Rosen (EPR) thought experiment. There seems to be a lot of evidence in support of Asimov's assertion, and 1905 stands out as a remarkably productive year in an amazingly fruitful career.

So, on the 100th anniversary of this miraculous year of physics, Sigma Pi Sigma will celebrate the World Year of Physics. That's why Einstein, and that's why 2005.

How will SPS and the Society of Physics Students (SPS) celebrate?

Of course, the Sigma Pi Sigma Congress, which was held on October 15–16, 2004, served as the kick-off event for WYP 2005. The Congress was held in Albuquerque, NM, and was a joint meeting with Zone 16 SPS members, as well as other regional physics groups. Jocelyn Bell Burnell, co-discoverer of pulsars and already an honorary member of Sigma Pi

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American Institute of Physics

The American Institute of Physics (AIP) is a not-for-profit membership corporation chartered in New York State in 1931 for the purpose of promoting the advancement and diffusion of the knowledge of the science of physics and its applications to human welfare. In order to achieve its purpose, AIP serves physics and related fields of science and technology by serving its Member Societies, individual scientists, educators, students, research and development leaders, and the general public with programs, services, and publications—***Information That Matters***.

The Institute publishes its own scientific journals as well as those of its Member Societies; provides abstracting and indexing services; provides on-line database and e-mail services; disseminates reliable information on physics to the public; collects and analyzes statistics on the profession and on physics education; encourages and assists in the documentation and study of the history and philosophy of physics; cooperates with other organizations on educational projects at all levels; and collects and analyzes information on Federal programs and budgets.

The Institute represents approximately 110,000 scientists through its Member Societies. In addition, approximately 5,000 students in more than 600 colleges and universities are members of the Institute's Society of Physics Students, which includes the honor society Sigma Pi Sigma. Industry is represented through 50 Corporate Associates members.

AMERICAN INSTITUTE OF PHYSICS

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American Physical Society
Optical Society of America
Acoustical Society of America
The Society of Rheology
American Association of Physics Teachers
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American Association of Physicists in Medicine
AVS—The Science & Technology Society
American Geophysical Union

Other Member Organizations

Sigma Pi Sigma, Physics Honor Society
Society of Physics Students
Corporate Associates

Letters to the Editor

Members since 1953

I see that Simon Ramo, '53, is still a regular contributor to your fund. I was the Secretary Treasurer at the University of Arizona chapter in 1953.

Early in the year our beloved Advisor, Professor Leon Blitzer, suggested that I invite Dr. Ramo to be our initiation banquet speaker. Dr. Blitzer knew Dr. Ramo personally since Dr. Blitzer would often work, during the summers, at the Hughes Aircraft Company, where Dr. Ramo was general manager before he moved on to form Ramo Wooldridge and Space Technology Labs that very same year, 1953. Also, both received their PhDs at Cal Tech (Blitzer, Physics, 1943; Ramo, EE, 1936).

Dr. Ramo graciously accepted and gave an interesting talk about the role of the physicist.

Please send me the form for a contribution to the 2003 Alumni Drive.

Albert Samuels
Sigma Pi Sigma Member '53

"Scottish" vs. "English"

As a professional research Physicist and a member of Sigma Pi Sigma since 1952 as well as a long-time serious student of Celtic History and Culture, I found the Vol. 9, Issue 2 of *Radiations* to be a source of considerable discomfort.

Scottish Botanist Robert Brown was no more English than Albert Einstein was Chinese (cf. pg. 18). $E=mc^2$ was first derived from the electromagnetic equations of Scotsman James Clerk Maxwell independently of Einstein. Irish Physicist George Francis Fitzgerald published the mathematical basis for the relativistic analysis of the Space-Time Continuum when Einstein was 11 years old...

Sincerely, Alfred E. Reilly

Of the several references I consulted in preparing the article, only one listed Brown's ethnicity or nationality It described him as "...Robert Brown, an English botanist..." (Richtmyer and Kennard, McGraw-Hill (1942), p. 183). Upon receiving your letter I looked further into the matter and learned that Robert Brown was born in Montrose, Scotland, on December 21, 1773. He studied medicine at the University of Edinburgh. In 1801, he sailed as botanist on a four-year voyage with Sir Joseph Banks, collecting specimens that went to the British Museum. Brown settled in London and died there June 10, 1858. That he lived most of his adult life in London may explain why Brown is often described as being English, when he was, in fact, born a Scotsman. Thank you for clarifying this point. —Editor ◆

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designed by the SPS summer 2004 interns around an Einstein theme, and will be disseminated to about 25 chapters around the country in 2005. The Marsh White Awards for science outreach ($300 each), the SPS Chapter Challenge Awards, and the SPS Zone Meeting Awards ($500 each) are three other awards given to chapters hosting events and programs with a strong WYP 2005 theme. Thus, dozens of SPS chapters and thousands of SPS members around the country are planning to conduct science demonstrations and outreach events for various community groups in 2005. The society web sites (www.sigmapisigma.org and www.spsnational.org) and publications have details of these awards, and other upcoming WYP 2005 articles as well as competitions.

Another unique opportunity for anyone with a computer is the Einstein@home research project, which uses spare computer time to analyze astronomical data for evidence of gravitational waves (see www.physics2005.org for details). I encourage you to get involved in WYP 2005 by participating in this effort and by contacting your local Sigma Pi Sigma chapter or physics department and asking about what is being