From Electrons Paired



To Electric Power Delivered







-- A Personal Journey in Applied Physics ---- IBM, EPRI, and Beyond --

Paul M. Grant

<u>IBM (1953-1993)</u>

- Joined 1953 (age 17)
- SAGE/NORAD (MIT)
- Clarkson/Harvard
- Magneto-optics
- Displays/Printers
- Organic Conductors
- DFT
- Superconductivity
- High-Tc
- Sabbatical (UNAM)

EPRI (1993-2005)

- High-Tc Power Apps
- Wide Bandgap SCs
- Power Electronics
- "Hot" Fusion
- "Smart Grid"
- "SuperGrid"
- Visionary Energy Societies

W2AGZ (2005-?)

- Due Diligence
- Tet-CuO (Stanford)
- "Proxy" DFT
- RTSC via DFT
- IASS Potsdam
- Dual Use of NG Pipeline ROWs for Co-transport of Electricity via HTSC Cables (e.g., Keystone)

The 2014 PMG **DLAP TOUR**

August - November

- Applied Superconductivity Conference (Charlotte, Luncheon Speaker)
- Clarkson University (Potsdam NY, Physics Colloquium & Lunch)*
- NY APA <u>Sectional</u> (SUNY Plattsburg, Plenary & Lunches)
- Mid-Hudson Valley (Meetings with Physics faculty, Marist and Vassar Colleges)
- Mid-Atlantic <u>Sectional</u> (Penn State, Panel Discussion)
- St. Mary's Honors College (St. Marys MD., Invited Lecture & Lunch)*
- Four Corners <u>Sectional</u> (UVU, Orem UT, Plenary & Lunches)*
- Far West <u>Sectional (UN Reno, Invited Talk & Lunches)</u>
- San Jose State University (San Jose, Monthly Science Seminar & Lunch-Student Discussions)*
- Ohlone College (Fremont CA, Discussions with Science Students & Faculty)

*The most fun. Buiochas, Alainn Garnion Crystal!

What are PhDs doing with their degrees?

Data courtesy of Crystal Bailey, bailey@aps.org

Types of Positions Accepted by Employment Sector, Classes of 2009 & 2010.					
		Postdoc %	Potentially Permanent %	Other Temporary %	Overall %
	Academic*	73	23	82	58
	Private sector	1	(57)	9	19
	Government	22	16	6	19
	Other	4	4	3	4
	Ν	740	365	89	1,194

Data only include U.S.-educated physics PhDs who remained in the U.S. after earning their degrees.

*Includes university affiliated research institutes.

http://www.aip.org/statistics

The largest percentage of Physics PhDs found initial employment in Postdoctoral and other temporary positions...

...but a significant number of graduates went straight into potentially permanent employment in the private sector.

PhD Employment in the Private Sector

Recall that the majority (57%) of graduates who initially went into permanent employment positions were in the private sector.

According to the NSF Survey of Doctoral Recipients, in 2010 the private sector was the largest single employment base of Physics PhDs: about 47% (the next highest was 4 year colleges, at 38%).

This was also true in 2001, when the private sector employed 46% of Physics PhDs¹...

...and was also true in 1993, when the private sector again employed 46% of Physics PhDs².

In fact, the same data has shown consistent support for Physics PhDs in the private sector since 1971.



¹NSF Survey of Doctoral Recipients, 2001 ²NSF Integrated Survey Data, 1993

Industry has been the largest employment base for Physics PhDs for decades.

Not only does the private sector provide the largest number of jobs for physics PhDs, it also provides the highest-paying jobs, with a starting salary of \$90K

By comparison, average typical starting salaries at Universities and 4-year colleges is around \$50K...

...and a University postdoc position typically offers between \$40K and \$50K.

> So, the private sector also offers well-paying employment to Physics PhDs.



Typical Annual Salaries in Thousands of Dollars

Data only include U.S.-educated PhDs who remained in the U.S. after earning their degrees. Typical salaries are the middle 50%, i.e. between the 25th and 75th percentiles. Government Lab includes Federally Funded Research and Development Centers, e.g. Los Alamos National Laboratory. UARI is University Affiliated Research Institute. The data for PhDs holding potentially permanent positions in academia include salaries based on 9-10 and 11-12 month commitments. "N" represents the number of individuals the salary data is based on.

http://aip.org/statistics

Heroes, Mentors and Buddies







Three Famous Applied Physicists



Joseph Henry



Michael Faraday



William Thomson



Two Other Famous Applied Physicists

Patented Nov. 11, 1930

1,781,541

ALBERT EINSTEIN, OF BERLIN, AND LEO SZILARD, OF BERLIN-WILMERSDORF, GER-MANY, ASSIGNORS TO ELECTROLUX SERVEL CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE

A Simple Household Refrigerator!



Leo Szilard





In your career in Industrial Physics, you can have both PRLs and Patents!

...and Finally One More...



Richard P. Feynman...The Spiritual Father of Nanotechnology (1959) *"There's Plenty of Room at the Bottom!"*

The Take-Home...

Wisdom gained (<u>so far</u>!) from a lifetime career in Industrial and Applied Physics...



"You can't always get what you want..."



"...you get what you need!"

