Business For Poets
Physics Careers Outside of Academia

Northern Illinois University
Physics Department Colloquium
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Sean Mattingly
My Background

• BS in Physics – Andrews University 1993
  – LLNL research semester
• PhD in Particle Physics – University of Wisconsin 1999
  – Research at CERN (ALEPH) and DESY (Zeus)
  – Calorimeter First Level Trigger
  – Dissertation: “Virtual Photon Structure With Zeus at HERA”
• PostDoc 1999-2005 – Brown University
  – Fermilab (DZero)
  – Data Acquisition System
  – Electroweak Physics/Diboson subgroup
    • $W\gamma$ cross section and limits on anomalous $WW\gamma$ couplings
• Bank of America 2005 – Present
  – IT operations management
  – Located in Chicago until 2008, now work from home in Colorado
Motivations

• Why does a physicist do physics?
  – Challenge
  – Work on interesting cutting edge problems
  – Do something very few people are capable of doing
  – Expand human knowledge
  – Make the world a better place
Career Paths

- According to APS 1500 US physics PhD/year (data from 2006-2008)
  - www.aps.org/careers/statistics/index.cfm
- Permanent academic jobs
  - PhD-granting institutions: 250-300 jobs/year
    - Advantages: Involvement in cutting edge research; teaching/campus life
    - Disadvantages: Long arc to stability; service, teaching, and student management work may preclude real research work, little geographic choice; extreme hours; saturated job market
  - Non-PhD-granting institutions: 200-250 jobs/year
    - Advantages: Focus on teaching; some research time; campus life
    - Disadvantages: May not be cutting edge research; long arc to stability; service and teaching work may preclude real research work; limited research budgets; limited in geographic choice; extreme hours/contact hours; saturated job market
Career Paths (2)

• Non-academic Jobs
  – ??? jobs/year, unsaturated job market
  – Advantages
    • Interesting problems/research
    • Make the world a better place
    • Mentoring/teaching
    • Time
    • Geographic choice
    • Stability
    • Income
      – Median university post-doc salary $45k
      – Median 2008 salary $85k for starting physics PhD (+ salary growth)
  – Disadvantages
    • Stigma
    • Stability
    • May not be on the cutting edge
The Non-academic Physicist

• “Physics minds are the brightest minds there are.”
  – Bruce Hopkins, Bank of America executive

• What do we have to offer?
  – Diversity of thought, no fear of unknown
  – Understand/analyze complex systems and technology
  – Identify and utilize correlations
  – Use of mathematics, statistics, algorithms and logic
  – Powerful problem solving
  – Effective teaching and mentoring

• Hurdles to overcome
  – Jack of all trades, master of none?
  – Communications perception…the Sheldon Cooper effect

• The world needs more physicists working in every kind of human endeavor.
Finding A Non-academic Job

• Be motivated
• Educate yourself
  – Know what is out there and what is needed
  – Know what you want
  – Know what you have to offer
    • Be specific
• Use and make connections
  – It’s not what you know, it’s who knows that you know it.
  – Professors, previous students, etc.
• A resume is not a CV
  – 1-2 pages
  – Stay on topic, focus resume on the job you’re applying for
  – Summarize experience and contributions
  – Be brief, strong and quantitative
  – Don’t be afraid to make what seem like big claims
Sean Mattingly

Physics Careers Outside of Academia

Profile
Energetic problem solver with extensive experience in IT support for a Fortune 100 company and research at international scientific laboratories. Specializing in the design, implementation and support of complex systems, as well as effective communication with critical audiences.

Work and Skills Summary

Bank of America, Chicago, IL
Highly experienced delivering support for complex, multi-tiered, trader- and customer-facing web-based and stand-alone applications.

VP: System Architecture Manager – Capital Markets (2006 present)
Manage team of 5 IT professionals in an application-hosting organization supporting all aspects of IT infrastructure for Global Foreign Exchange (GFX) applications. Manage the relationship between the GFX line of business and the application-hosting organization in order to provide maximum efficiency of services. Includes support of networking, databases, messaging, middleware and system administration. Team also provides monitoring and incident/problem management for development and production environments and issues.
  - Linux/Solaris, Oracle, MQ/TibcoRV, in-house monitoring/deployment applications, MS Office

Managed team of 2 IT professionals which supported the operations of web-based wealth management and stand-alone trading (NYSE Specialist) applications with a business-aligned team in an application-hosting organization. Provided monitoring, incident/problem resolution, change-control management, and new application integration.
  - WinKVM and Linux/Solaris, IBS/SunOne, Perl and tcsh scripting, SiteScope, in-house monitoring/deployment applications, MS Project/Office

IT Consultant – Technology Services Group (2005)
Supported the operations of a suite of web-based, commercial on-line applications with a business-aligned team in an application-hosting organization. Provided monitoring, incident/problem resolution, and change-control management.
  - Solaris, Perl and tcsh scripting, SunOne, WebSphere, MQ, ColdFusion, SiteScope, in-house monitoring/deployment applications, MS Office

Brown University, Fermilab, Chicago, IL
Highly experienced with data-acquisition systems, data mining and statistical analysis of large, multivariate data sets and Monte Carlo simulation techniques

Research Fellow – DZero Experiment (2000-2005)
Managed research groups of up to 4 contributors including scientists, technicians and graduate students in 700-member international collaboration analyzing large, multivariate data sets to produce world’s most accurate measurements of particle-creation probabilities.

Effectively communicated through journal papers, internal documentation and weekly presentations as well as presentations at international conferences and university colloquias.
  - Linux, C++, Physics Analysis Workstation, HTML, MS Office

Led in the design, implementation and operation of networked VME data acquisition for cutting-edge particle-physics experiment. Included electronics design, system integration, monitoring design and operations.
  - WinKVM, C++ (VisualStudio), Java/Swing, JavaScript, HTML, XML, MS Office

University of Wisconsin, Madison, WI
Graduate Research Assistant – ZEUS experiment (DESY, Germany) (1995-1999)
Analyzed large multivariate data set to produce world’s first measurement of virtual photon structure.

Supported operations of customized VME trigger electronics.
  - FORTRAN, Physics Analysis Workstation, Ultrix/SGI, HTML

Teaching Assistant – “Physics for Engineers” (Madison, WI) (1995)
Taught physics problem-solving skills to multiple classes of about 25 students each.

Graduate Research Assistant – ALEPH experiment (CERN, Switzerland) (1993-1995)
Analyzed simulated data sets to determine potential measurements at future experiments.
  - FORTRAN, Physics Analysis Workstation, Ultrix/SGI, HTML

Education

Ph.D., Particle Physics
University of Wisconsin-Madison
Advanced Opportunity Fellowship 1993-1994
1999

B.S., Physics with honors
Andrews University, Berrien Springs, MI
Presidential Scholarship 1989-1993
1993
Finding A Non-academic Job (2)

• The interview
  – Research the company/job opening
  – Be on time/early, dress right, be polite, etc.
  – You are better than you think you are
  – Interview them as much as they interview you
    • Find out what their main needs are
    • Point out how your skills can make a difference
  – Be ready for things to move fast
Conclusions

• Thanks to Gerry Blazey, Yasuo Ito and Francois Lemery for making this talk happen.

• Your primary focus should be on non-academic jobs.
  – Statistics…this is actually a professional degree
  – Impact on the world
  – Quality of life

• Make connections, expand your view

• Physicists improve the world by infiltrating it