Second Graduate Education in Physics Conference
Breakout Session 1: Non-Academic Careers

Speaker: Stefan Zollner, New Mexico State University, Las Cruces, NM
Moderator: Larry Woolf, General Atomics Aeronautical Systems, Inc.

Stefan Zollner’s notes and comments
Based on statistics from NSF, AIP, and other sources, only about 20% of Ph.D. physicists become university professors at two-year, four-year, and graduate-degree granting universities. Perhaps only 10% of Ph.D. physicists become clones of their advisors and obtain a faculty position at a Ph.D. granting university themselves. This fact is not known to many graduate students and therefore a much larger percentage of students aspire to become physics professors. Students should be informed as early as possible about these statistics and all available options for physics careers, including positions at national laboratories (research and non-research science positions), industry, technology, and other private-sector jobs. University career services are a good resource. Other resources include former students of the advisor (much more than the advisors themselves), other alumni of the department, career fairs at APS meetings, professional, industrial, and engineering conferences, etc.

Physics department should follow their alumni and perform alumni surveys. These surveys would provide information about physics careers. Also, the surveys are useful tools for graduate program assessment, since they will reveal which skills the alumni need to be successful in their jobs and how such skills could be taught to students during their graduate study program. Physicists in industry (or in non-research positions at national labs) should be invited to give colloquia or seminars for graduate students to act as role models for future industrial physicists. Social networking tools like LinkedIn are other tools to stay in touch with program alumni. (Only 2 of about 30 departments represented in the break-out session perform alumni surveys, with about a 15% response rate.)

This speaker (Stefan Zollner) is very concerned about the need to properly assess our physics graduate programs. We need to set realistic educational objectives and alumni surveys need to prove that we meet our objectives. Assessment will help our institutions and our communities (who fund public institutions) understand the value of our Ph.D. physics programs and will help us recruit students into our undergraduate programs (which will feed our Ph.D. pipeline with domestic candidates).

The APS careers web site should show videos of accomplished industrial physicists (similar to career videos at the IEEE web site). Physics departments should convene advisory boards with demographics consistent with the alumni of the department (not just other physics professors). AIP has just completed a new survey on industrial physicists and it will be interesting to see the results. (Cherry Murray’s after-dinner talk may have given us a sneak preview of the latest AIP survey results.)

In the engineering world, graduate students often complete internships at companies or federal labs. In the physics community, this is not common, since students are more likely to focus on
their research over the summer (with encouragement of the advisor). This is a barrier for students to get an early glimpse into physics career options.

Scribe 1 (Christopher Salvo) Notes

Zollner:
Gave a talk last year at chair talk, hopefully still available on APS website
What if we had to worry about accreditation?
Over the past 5 years (2008-2012) how many students received a Ph.D. in your department?
What do they do after they leave your department?
Are there people who have better data than I do? About 10% or 5/30

Alumni association knows where the students are after they graduate but they don’t communicate this information to the departments
We don’t know where the Ph.D.s are after 10 years
If you can’t measure it, you can’t change it.
In physics, we commonly do not follow our graduates
Patrick Mulvey-following students, information on skills, salaries
Permanent communication, for instance LinkedIn
This isn’t easy
Has anyone tried to set up a survey?-One person said yes
AIP and NSF have good data sets
About 20% of physicists become professors; Half of those work at Ph.D. granting institutions


Early career salaries are higher in industry; in industry, salaries tend to flatten off
Federal labs, once you are in, are highly difficult to get out because there are some classified topics that cannot be discussed or published; similar with defense contractors
It is hard to go into industry and then back into academia
It isn’t too hard to do what was just said (conflict of ideas)
Undergraduate advisor for physicists: Think about the next step after Ph.D., next step after post doc
Consulting faculty positions, untapped group of industry physicists who can co-advice
Trying to help departments stay open
Students need help to get internships
Need conduit for setting up internships
General Atomics has internships for undergrad and early grad students
If we want to help students get jobs, then REUs are really important

APS website (who hires physics bachelors):
http://www.compadre.org/careers/employers/
http://www.aps.org/programs/education/whystudy.cfm
Very important for students to collect employment data
How do you help students look at industry?
When bringing back Ph.D. students, it helps students think about their idea of careers. Thinking about what it takes to get a job.
Marketing problem for physics students
It’s how you did things, not what you did.
Ph.D.s are in a bubble
Students at Cornell have found useful: Go to undergrad career center, job fare (who sets up these fares?)
Undergrads just don’t know a lot of this info
At Berkeley they sponsor former alums to come back every month so they can talk about their experiences
Radical idea, at NIST where industry gets together
If they can compete with the engineers at conferences they can compete for jobs
Questions for students: What job do I want? How am I qualified? How can you market yourself?
Lots of comments, people have lots of ideas
Cornell hired a person in career center who works directly with grad students (people say it’s good)
Institutions only care about which Ph.D.s went on to become professors at high institutions
People think that they can either be a professor or failure
Redefine physicist to hire them
What kind of skills do graduate students have or need?
Sounds like relocating can be challenging
How many do alumni surveys at the graduate level? 2 out of 30
We don’t get many responses from Ph.D.s students
Larry does all sorts of problems, not end of chapter question
Ted used physics skills with the solution of the Bridge program, these are the kind of skills used in industry all the time.
Come up with actionable plan
Do you just have a new model in physics for education? How do you do that?
Much more design oriented problems
Engaging students to create
In companies Bachelors, Masters, and Ph.D.s all have their places and very different roles
So it seems like Ph.D.s highly developed for solving very real and large problem sets
As a physics Ph.D. you can’t compete with an engineer, chemist or biologist in their specific fields. Physics looks outside of the box.
Working with interdisciplinary teams is very important

**Takeaways**
Inform students about employment statistics
Keep in touch with alumni, so they can interact with them
LinkedIn as tool
Alumni surveys
AIP tries to do alumni surveys, so the departments should work with Patrick Mulvey who works with AIP’s Statistical Research Center
High note- unemployment rate for Ph.D. physicists is around 3% out of the gate
Reach out to APS