Career Planning for Physics Majors

Prof. Robin Selinger
Liquid Crystal Institute
Kent State University
And find the next step for your physics-trained brain.

Let’s look at the options and map the terrain.

You’ll want a Plan D and Plans E, F, and G.

You might change your mind, so I’m sure you’ll agree,

In case of emergency, make a Plan C.

So make a Plan A, make a Plan B,

But finding your future is all up to you.

Your physics professors are helpful, it’s true,

So don’t lie around unemployed in Mom’s basement.

The future’s a time for surprise and amazement.

And you can steer yourself.

Directions you choose,

You have feet in your shoes.

You have brains in your head.
Which way will you go?
3

Straight to the workforce or graduate or professional school or public service or workforce or straight to the...
Which way will you go?

Back to school?

Graduate or professional

Public service or workforce or straight to the

Which way will you go?
National Labs

- About 10% of BS grads find initial employment in national labs
- Starting salaries: $35,000-$55,000
- Often begins with an REU or internship
- Federal employee or "contractor"
- About 10% of BS grads find initial employment in national labs

Straight to the workforce

Physics labs

- University affiliated federal labs: Lincoln Lab, Hopkins Applied
- NASA, NOAA
- and NIST
- National Institutes of Health (NIH), National Institute of Standards
- Army Research Lab
- Dept. of Energy: Los Alamos, Livermore, Sandia, LBL...
- Dept. of Defense: Naval Research Lab, Air Force Research Lab
- Dept. of Energy: Los Alamos, Livermore, Sandia, LBL...

USAJOBS.gov "Pathways" positions for students and new grads

Visit USAJOBS.gov for "Pathways" positions for students and new grads.
Private sector jobs

- About 40% of BS graduates find initial employment in private sector
- Starting salaries $40,000 - $65,000

Technical performance tests used in hiring

Entrepreneurship / start-ups

- Company is sponsoring concurrent graduate study!
- Works at Northrop Grumman
- Works at Amazon
- Works at Amazon
- Works at Amazon

Straight to the workforce

- ABOUT 40% OF BS GRADS FIND INITIAL EMPLOYMENT IN PRIVATE SECTOR
- STARTING SALARIES $40,000 - $65,000
- TECHNICAL PERFORMANCE TESTS USED IN HIRING
- ENTREPRENEURSHIP / START-UPS
- COMPANY IS SPONSORING CONCURRENT GRADUATE STUDY!
About 11% of BS grads find initial employment in K-12 teaching.

Starting salaries: $31,000 - $45,000

Private Schools (Placement service: http://www.carneysandoe.com)

• Teach for America

Public Schools/Pathways to Certification

• Alternative Certification
• UTeach, Noyce Scholars, Woodrow Wilson Fellowships

• Teach to the Workforce

Straitght to the workforce

Taught at private school and completed a physics PhD at the same time... now staff scientist at the Army Research Lab
• Public Service
• Military Service
• Peace Corps
• Nonprofits
• Religious organizations
• Government Jobs:
  • USAJOBS.gov
  • Search for "Pathways" jobs for new grads

Straight to the workforce
Grad school or professional school?

- Medical School (MD, DO)
- Dental School
- Law School
- Architecture
- Monthly stipend $20-40K
- Grad school in the sciences
- Grad school in the hybrid option: MD PhD
- Free tuition!!
- 5 to 7 years

Tuition, living expenses cost $200-300K in loans
Options for graduate study in the sciences:

- Basic Science
- Applied Science
- Engineering

- Physics
- Astrophysics
- Nuclear Engineering
- Medical Physics
- Materials Science
- Chemical Engineering
- Chemical Physics
- Biophysics / Biological Physics / Physical Biology
- Applied Physics
- Optics / Photonics

... MANY choices beyond pure physics!!!
Who gets in to grad school in Physics?

Grade Point Average on 4.0 scale
Where do new PhDs go?

- Tenure-Track
- Lecturer
- Adjunct

- Postdoc: short term research position
  - Postdoc at a university: 62% of recent PhDs take a postdoc position
  - Industry and National Labs: $45K-65K
  - Postdoc: starting salary $75K+

- National Lab
  - Sales: $125K
  - R&D: $80K - $100K+
  - Industry
  - Sales: $95,000 - $125,000
  - Starting salary

- Academia
  - Community College
  - Regional Campus
  - Liberal Arts College
  - Research University
  - Starting salary $70,000 - $95,000

- Less than 20% of Grad students will hold permanent faculty positions
- 62% of recent PhDs take a postdoc position
- 60% of recent PhDs take a postdoc position
3 Moves in 4yrs ... postdoc2 postdoc1 career position

Beware: the "Two-body problem"

moves with my partner? Stay close to my family?

Geography: Where will I live? I coordinate my

Salary: Can I earn enough to live comfortably and support my family?

Work/Family Balance: How much free time will I have? How will I manage my time if

Travel: Will I get to attend science conferences? How much time on the road?

Will my work be classified? Will I need security clearance?

Is my work going to be proprietary?

Will my work produce publications or patents?

Will I have access to a science library?

Will I get to choose the projects I pursue?

Will I have a mentor?

Will I have work? Can I earn specific hours? Can I work at home? Will I be on call after hours?

Will I have more than one move in 4 years?

Geography: Where will I live and how often do I have to move? Can I coordinate my

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Liquid crystal basics... optics + phase behavior + device design

Cholesteric
Masters and PhD Programs

- Liquid Crystal Engineering
- Chemical Physics
Kent State alumni at Apple design displays for iPhone, iPad, iPod, iMac...

Thank you Kent State...!
Career pathways for KSU Chemical Physics Grads (other than working at Apple…)

- Quantitative Finance
- Industrial R&D
- Federal Lab
- Tech entrepreneur
- Postdocs
- Professors
Flexible Active Nematic Liquid Crystals – self-propelled

My own work...
Microstructural and shape evolution of lipid vesicle – phase transition
- 2 defect, heating → scalar order parameter drops

Simulation of liquid crystal polymers: programmable solids
Thinking outside the box... unusual career pathways
Introduction to Graduate Fellowships

Prof. Robin Selinger
a.k.a. "The Fellowship Queen"

Liquid Crystal Institute
Kent State University
Why do I call myself the Fellowship Queen...?
Because my education was sponsored by...

Undergraduate Scholarships:
- National Merit Scholarship
- National Merit Scholarship Program Fellowship

Graduate Fellowships:
- University of California President's Fellowship (UCLA)
- Link Foundation Fellowship
- NASA Graduate Student Researcher Program Fellowship
- National Science Foundation Graduate Fellowship

Postdoctoral Fellowships:
- Amelia Earhart Fellowship-Zonta International
- Zonta International

Travel Scholarships for Summer Research:
- National Research Council Fellowship (NIST)

Why do I call myself the Fellowship Queen...?
Who should apply?
• College seniors
• Graduate students
• Postdocs

When to apply?
Deadlines vary, mostly fall

What are the advantages of fellowships?
• For grad students
  Less teaching, more research
  Independent control over own funding
  More freedom to choose an advisor
  More freedom to select a research area

Who should apply? • Postdocs • Graduate students • College seniors
Fellowship information sources

Information sources (examples):

- http://www.science.gov
- http://www.nas.edu
- http://www.grantsnet.org
- http://grants.nih.gov/training/extramural.htm
- http://www.scholarships.umd.edu/
- http://www.graduate.cornell.edu
- http://portal.acs.org/portal/PublicWebSite/education/students/GraduateScholarships

American Chemical Society:

http://portals.acs.org/portal/PublicWebSite/education/students/GraduateScholarships

Internships/121132664603

Cornell:

http://www.gradschool.cornell.edu?
p=132

U Maryland:

http://www.scholarships.umd.edu/

http://Grants.nih.gov/Training/Extramural.htm

http://www.grantsnet.org

http://www.nas.edu

http://www.science.gov

Fellowship information sources
US Government-sponsored graduate fellowship: Example

National Defense Science and Engineering Graduate (NDSEG) Fellowships

Eligible: Seniors, 1st and 2nd year Grad students, US citizens only

OE: Oceanography, Physics

Mechanical Engineering, Naval Architecture and Ocean Engineering,
Geosciences, Materials Science and Engineering, Mathematics,
Mechanical Engineering, Geosciences, Materials Science and Engineering, Mathematics,
Behavioral Sciences, Computer and Computational Sciences, Electrical
Chemical Engineering, Chemistry, Civil Engineering, Cognitive, Neural, and
PhD students in: Aeronautical and Astronautical Engineering, Geosciences,

Historically, around 10% of applications are accepted

$34,000/year

3 years of tuition/fees + monthly stipend

http://ndseg.asae.org/
What NDSEG Fellows say...

...The prestige associated with the award helped me stand out as an applicant to various graduate fellowships.

...The funding itself helped me get my foot in the door of research groups doing the work I'm most passionate about. The freedom of having one's own support, I've found most interesting, not those that have been dictated by someone else's grant.

The academic freedom that is enabled by the NDSEG Fellowship is invaluable. With this freedom of having one's own support I've been able to pursue the projects that I've found most interesting, not those that have been dictated by someone else's grant.

The freedom of doing the research groups doing the work I'm most passionate about and the funding associated with the award helped me stand out as an applicant to various graduate fellowships.
What other Federal Agencies sponsor graduate fellowships?

Also look there for paid internships at national labs

NSF, NIH, DOE, NASA, NOAA, DHS

Agencies to check:

http://stemgradstudents.science.gov/complete list: Graduate fellowships?

What other Federal Agencies sponsor
DOE Computational Science Graduate Fellowship

Fields:
- Aerospace and Aeronautical Engineering
- Applied Mathematics
- Astronomy
- Biomedical Applications and Engineering
- Biology
- Chemistry
- Computer Science
- Computational fluid dynamics
- Electrical and Computer Engineering
- Environmental Science and Engineering
- Materials Science and Engineering
- Mechanical Engineering
- Nuclear Engineering
- Oceanography
- Physics

Benefits:
- All tuition and fees
- A yearly stipend of $36,000, up to four years
- Allowance for travel and research expenses
- Allowance to buy a computer workstation

Applications and Engineering
- Applied Mathematics
- Astronomy
- Biomedical Engineering
- Astronomy
- Biomedical

Fields: Aerospace and Aeronautical Engineering

DOE Computational Science Graduate Fellowship
DOE Office of Science Graduate Fellowship Program

Fields: physics, chemistry, biology (non-medical), mathematics, engineering, computer science, environmental sciences

Eligible: US citizens; seniors, 1st or 2nd year grad students

Benefits: $35K stipend, $10.5K for tuition plus $5K in research funds (travel, supplies, etc.)

Students
Privately-funded fellowships (companies, foundations)

- Companies
  - IBM (helps if your advisor has a collaboration with)
  - Private foundations
    - Hertz Foundation (US citizens/permanent residents)
    - Link Foundation (energy-related research)
    - Can only use at specific schools

Citizenship requirements often less restrictive
Strategies for the application process

- Deadlines, page limits are 100% firm
- Get help from a mentor or advisor
- Watch for standardized tests and other requirements
- "Head+Heart+Hands"... Intellectual engagement, Emotional attachment, Physical accomplishment, Goals
- Essay: capacity for hard work
- Essay: personal attributes
- Essay: scientific content
- Essay: show your smarts
- Essay: show your enthusiasm
- Essay: special strengths: planets have aligned!
- Explain match between your preparation/goals and your target institution’s special strengths

http://www.ets.org/gre/subject/register/centers_dates/

- Deadlines to register for fall GRE subject test are in AUG and SEP
- Watch for standardized tests and other requirements
- Get help from a mentor or advisor
- Deadlines, page limits are 100% firm

"Head+Heart+Hands"... Intellectual engagement, Emotional commitment, Capability and drive to succeed
Important, Unforgivable

DON'TS

• Don’t exceed the page limit
• Don’t use the wrong font, pagination, spacing
• Don’t skip any sections
• Don’t think “This section couldn’t possibly be important/necessary/essential…”
• Don’t do this on your own

DON'TS
Important, Unforgivable
Short. Your passion.
Live your dream.
So go out and start creating.
The things you create with them.
Life is about the people you meet, and
some opportunities only come once.
Size them.
Travel often.
Getting lost will help you find yourself.
Get your insipiring dream with them.
Ask the next person you see what their passion is.
And people, we are united in our differences.
Open your mind. Arms. And heart to new things.
Every last bite.
Life is simple.
Stop over analyzing.
All emotions are beautiful.
Start doing things you love.
They will be waiting for you when you stop.
If you are looking for the love of your life, stop.
If you don't have enough time, stop watching tv.
Do what you love.
And do it often.
Life.
This is your.