Undergraduate Research Opportunities in Physics

USU SPS March 11, 2010
Why Should I do Research?

• You can’t know what science is until you actually do some
• It’s *mandatory* if you want to compete successfully for national scholarships & awards
• It’s *mandatory* if you want to compete successfully for a job or for admission to graduate school
• LETTERS, LETTERS, LETTERS!
• Best of all: Doing research is exciting and fun
How do I get Started?

• Read the Department UROP handout
• Identify an area of interest
• Introduce yourself to the mentor explaining your interest
• Bring a CV indicating what skills you possess
• Be prepared to work your way up
How do I Succeed?

• Be brave, don’t fear failure
• Take OWNERSHIP!
  – Become a creative contributor
• Go to conferences, make presentations, tell others what you’ve done (your mastery will increase)
Opportunities in the Department
FAST: Fields, Astrophysics, and Spacetime Theory

Shane Larson

Charlie Torre

Jim Wheeler
FAST

Observation

- Visible
- Radio
- Balloons
FAST

Theory

• General Relativity
• Quantum Field Theory
• Mathematical Physics
Notable Alums

• Lara Anderson
• Jamie Jorgensen
• Sidney Chamberlin
CSAA: Center for Surface Analysis and Applications

JR Dennison

Mark Riffe

TC Shen
Experiment & Theory

- Electron transport & emission
- Ultrafast dynamics in semiconductors
- Carbon nanotubes & adhesion
Notable Alums

- Jennifer Albretsen Roth
- Ryan Hoffman
- Steve Hart
- Rich Wilson
- Jeri Brunson
- Sterling Smith
- Jodie Corbridge
Instrument Design & Observation

- Digital & video imaging systems
  - Sprites, Elves
  - gravity waves, meteors ...

- LIDAR
  - temperatures, densities, waves in mesosphere
Space Weather

- Forecasting models
- Ground-based radar
Notable Alums

- Jodie Barker-Tvedtnes
- Jan Marie Andersen
- Chris Olsen
Experiment & Theory

- Dynamical modeling
- USU Tokomak
Notable Alum

- David Hatch
Complex Materials & Dynamics

Tim Doyle

David Peak

(a) (b) (c) (d)
Theory

- Modeling waves in granular systems & biological tissue
- Modeling heat deposition for tissue ablation
- Modeling computation in plants
Experiment

- Tissue cultures
- Stomatal patchiness
- Circuits that mimic biology
Notable Alums

- Paul Simonson
- Richard Datwyler
- Susanna Messinger
- Jevin West
- Keith Warnick
Get Away Special Research Team

- USU’s most prominent student academic organization
- 20-30 volunteer researchers
- all majors welcome
- devise, design, build, fly, and analyze experiments in space and zero-g
- outreach to local grade schools
- many “alumni” employed in aerospace industry

Meets every Wednesday at 5 PM in SER244
Beyond USU Physics

- Employment at SDL
- NSF REU program
- DoE SULI program
- Industrial internships
What are You Waiting for???
Who’s Who

<table>
<thead>
<tr>
<th>Name</th>
<th>Position and Awards</th>
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<tbody>
<tr>
<td>Lara Anderson</td>
<td>Goldwater, Rhodes, NSF Fellow, PhD Oxford</td>
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<tr>
<td>Jamie Jorgensen</td>
<td>Goldwater, PhD Rhode</td>
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<tr>
<td>Sydney Chamberlin</td>
<td>Goldwater*, Rhodes*, SPSOUR*, COSOUR, PhD Wisconsin†</td>
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<tr>
<td>Jennifer Roth</td>
<td>Goldwater, PhD Oregon St†</td>
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<tr>
<td>Ryan Hoffman</td>
<td>1st Prize Small Sat Student Paper</td>
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<tr>
<td>Steve Hart</td>
<td>PhD Wisconsin†</td>
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<tr>
<td>Rich Wilson</td>
<td>PhD Illinois†</td>
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<tr>
<td>Jeri Brunson</td>
<td>NASA Fellow, PhD USU</td>
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<tr>
<td>Sterling Smith</td>
<td>DoE Fellow, PhD Princeton†</td>
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<td>Jodie Corbridge</td>
<td>Posters on Hill</td>
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<td>Jodie Barker-Tvedtnes</td>
<td>Goldwater, SPSOUR, SPS Leader, PhD UCLA†</td>
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<td>Fulbright, COSOUR, PhD Boston U†</td>
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<td>Posters on Hill, officer US Navy</td>
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SPSOUR = Society of Physics Students (SPS) Outstanding Undergraduate Researcher
SPS Leader = National SPS Leadership Scholar
COSOUR = College of Science Outstanding Undergraduate Researcher
Small sat = AIAA Small Satellite national Conference
Posters on Hill = Council on Undergraduate Research Student Posters at National Capitol
* = honorable mention
† = still a student