

## Careers in Physics and Astronomy

What can you do with a degree in physics (or astronomy)?

It depends on the level of the degree.

- Bachelor's degree            B.S. or B.A.
- Master's                    M. Sc.
- Doctorate                  Ph.D.

What are your career goals?

Two methods for planning a career

1. **Process oriented:** First get a college degree, majoring in a subject that you find interesting. Then look to see what jobs you are qualified for.
2. **Goal oriented:** First decide what you want to do in your working life. Plan your college courses based on your goals.

Both methods are valid. The best is probably some combination of the two.

## A Physics Major as the Preparation for a Career

Examples of career choices of MSU physics majors:

- scientific research
- education (college or high school)
- industrial research
- engineering
- computing (software, hardware, networks)
- law, medicine, business, . . .

Physics is a good preparation for many different careers.

Some of these require graduate or professional school.

## Graduate School in Physics or Astronomy

If your goal is to become a research scientist, and to get a job focused on research in academia or at a national laboratory, you should get a Ph. D.

Don't be scared away by the idea of being a perpetual student.

- ▶ Graduate school is more like having a job than being a student.
- ▶ You don't need to pay for graduate school. You can support yourself financially by being a TA or RA, or with a fellowship.
- ▶ Being a research scientist is like being a physician. It requires years of training. The job involves long hours and dedication.

## Comparing M. D. and Ph. D.

M. D.	Ph. D.
4 yrs college	4 yrs college
4 yrs med school	4-5 yrs grad school
⇒ M. D.	⇒ Ph. D.
internship (2 yrs)	post-doc (2-4 yrs)
residency (a few years)	employment in research

▶ Becoming a research scientist (i.e., professor, or laboratory scientist, or industrial scientist) is similar to becoming a doctor.

▶ Science is a *profession*, not just a job.

# Physics and Astronomy at Michigan State University

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## Main research groups

- Nuclear Physics, the NSCL
- High-energy Physics at Fermilab and CERN
- Condensed Matter Physics
- Astronomy and Astrophysics

Many students get involved in research projects as part of their education

[www.pa.msu.edu](http://www.pa.msu.edu)

Other careers

- **Engineering**

Engineering is applied science.

Mechanical or electrical engineering rely on a background in physics, but the education is somewhat different.

Possibilities

- ▶ double major

- additional major

- second degree

- ▶ Master's degree in engineering

- ▶ On the job training

Other careers

- Education

College or university — Ph. D.

High school — state certification, which requires

- education courses
- student teaching

Many high school physics teachers also teach another subject, e.g., chemistry, math, or computer science.

Not highest paying, but rewarding.

Other careers

- Computing

Hardware

Software

Networks

Employers are looking for computer science majors (software) or computer engineering majors (hardware) but physics majors can also get these jobs.

If you are interested in this, apply for a job with the physics department computing group (Room 125).

Other careers

- Industrial labs

Engineering versus laboratory measurements

Data analysis

Some web pages

[www.aip.org/statistics/trends/trends.htm](http://www.aip.org/statistics/trends/trends.htm)

[www.aip.org/statistics/trends/states/state.htm](http://www.aip.org/statistics/trends/states/state.htm)

[www.cap.ca/careers/](http://www.cap.ca/careers/)

[www.monster.com](http://www.monster.com)

# Skeleton

GreenYellow Turquoise SeaGreen PineGreen  
OliveGreen

GreenYellow Yellow Goldenrod Dandelion Apricot  
Peach Melon YellowOrange Orange BurntOrange  
Bittersweet RedOrange Mahogany Maroon  
BrickRed Red OrangeRed RubineRed  
WildStrawberry Salmon CarnationPink Magenta  
VioletRed Rhodamine Mulberry RedViolet  
Fuchsia Lavender Thistle Orchid DarkOrchid  
Purple Plum Violet RoyalPurple BlueViolet  
Periwinkle CadetBlue CornflowerBlue  
MidnightBlue NavyBlue RoyalBlue Blue Cerulean  
Cyan ProcessBlue SkyBlue Turquoise TealBlue  
Aquamarine BlueGreen Emerald JungleGreen  
SeaGreen Green ForestGreen PineGreen  
LimeGreen YellowGreen SpringGreen OliveGreen  
RawSienna Sepia Brown Tan