

AST 205. Lecture 24. December 10, 2003  
Panel Discussion: Goodman, Strauss & Turner

This will be an informal and unrehearsed discussion of a variety of topics that have arisen in AST 205 over the semester. We will both comment on points which we think to be of particular importance and express our individual opinions on various issues, some of them controversial or speculative. We will *not* present a complete or systematic review of the course, and much important material will go unmentioned.

## AST 205 Final Exam

- **Sunday**, Jan 18: 1 to 4 pm
- 145 Peyton Hall (Lecture Hall)
- Exam will consist *entirely* of questions selected from a list which will be distributed in advance
  - **Preliminary** version/list available today
  - **Final** version/list distributed at the beginning of reading period (web site & at review sessions)
- Review sessions: Jan 7 & 12, 7-10pm (145 Peyton Hall = Lecture Hall)
- 40% of course grade

### Possible discussion topics

- How important is the discovery of extrasolar planets, scientifically and more generally? What are the most significant/interesting things which we have learned about extrasolar planets to date?
- Are our inferences about the properties of extrasolar planets based on the radial velocity method reliable or could we be being misled in some important way?
- What other/new techniques for detecting extrasolar planets are most promising and practical?

### Planet-detection methods

- |                           |                           |
|---------------------------|---------------------------|
| • Radial velocity         | • Reflected light         |
| • Astrometry              | • Transmitted light       |
| • Transits                | • Auroral emissions       |
| • Pulsar timing           | • Radio emissions         |
| • Gravitational lensing   | • Anthropogenic signals   |
| • Disk shaping            | • Coronagraphic imaging   |
| • Differential astrometry | • Interferometric imaging |

### Possible discussion topics (continued)

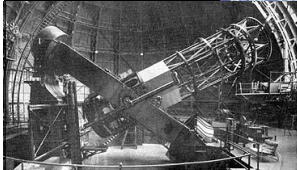
- How well do we understand the origin of galaxies, stars and planetary systems, including the Solar System and the Earth?
- How close are we to understanding the origin and fundamental properties of life? Are our general concepts about the origin and evolution of life on Earth, as described in class, likely to be correct?
- Is the focus of the TPF project on the search for Earth-like planets orbiting in the habitable zones of Sun-like stars a sensible and realistic approach?

### Possible discussion topics (continued)

- Would we be surprised if microbes were found on Mars? Would we be surprised if, after a thorough search, *no* microbes were found on Mars? Europa?
- Will it be possible to determine whether extrasolar planets, if any, are hospitable to life and/or have life on them via observations in the foreseeable future?
- $N = f(p)n(e)f(l)f(i)f(c)R_{\oplus}L$  What are the most reasonable estimates of the factors and of  $N$ ?
- How reliable/useful are “time statistics” arguments?
- SETI? Interstellar travel? Fermi Paradox?
- Questions/issues raised by the class.

## Planet Finding Is A Decades-Long Undertaking

- Like cosmology, the search for planets and life will motivate broad research areas and utilize many telescopes for decades to come



NASA's program for planet finding will be broad and rich, with results emerging on many time scales, from the immediate to the long-term

- There are exciting, mid-term ways to detect giant planets and the nearest Earths

## AST 205 Final Exam

- Sunday, Jan 18: 1 to 4 pm
- 145 Peyton Hall (Lecture Hall)
- Exam will consist *entirely* of questions selected from a list which will be distributed in advance
  - Preliminary version/list available today
  - Final version/list distributed at the beginning of reading period (web site & at review sessions)
- Review sessions: Jan 7 & 12, 7-10pm (145 Peyton Hall = Lecture Hall)
- 40% of course grade