Showcase current research and research opportunities in the department

Some semester some summer research
Basic (big) questions

- Where does the universe come from?
- How did it evolve to today?
- How will it evolve in the future?
The CMB is all around us

The CMB light is coming to us from all directions

\[ T(\vec{\theta}) \]

\[
\alpha(k) = \int T(\vec{\theta}) e^{i \vec{\theta} \cdot \vec{k}} d^2 \theta
\]
Improving observations

- 1992: COBE, first time the CMB fluctuations were measured
- 2003: WMAP satellite produces first clear picture of CMB fluctuations
- 2013: Planck satellite produces as clear a picture of CMB fluctuations as you can practically get

Figure by Sudeep Das

Data released this past summer!

![Graph of temperature fluctuations vs. multipole moment and angular scale]
Gravitational waves

A pulsar is a very accurate clock. Gravitational waves cause the pulses to be delayed/advanced. Monitoring a large number of pulsars (i.e., a pulsar array) may provide the best chance.

Xavier Siemens:
Colloquium on Dec. 2nd!
Next steps

- If interested fill out Preference Form and hand in to Carolyn by December 4th

- General research opportunities on P&A website and other handouts