

Weekly assignment 8: Recent discoveries

Due: November 21, 2005 at 6 p.m.

Give the **larger significance** of the following discoveries:

In 1965, two Bell Lab researchers, Arno Penzias and Robert Wilson, discovered that, no matter where they pointed their microwave telescope, they found microwave radiation corresponding (remember Wien's Law?) to a temperature of 3 Kelvins.

In 1968, Jocelyn Bell, a researcher at Cambridge University, found radio telescope signals coming from certain stars that came in pulses; that is, the intensity of the signal from the star would increase and decrease at regular intervals.

In 1995, Michel Mayor and Didier Queloz of the University of Geneva found that absorption lines from the star 51 Pegasi were red-shifting and blue-shifting on a regular 4.2-day cycle.

Also in 1995, Andrea Ghez at UCLA used the Keck I telescope and technique called "infrared speckle interferometry" to measure the velocity of stars orbiting near the center of the Milky Way galaxy. To her surprise, the stars were moving about 10 times faster than she had expected, evidence of a stronger-than-expected gravitational pull.

In 1998, Saul Perlmutter and his research group at UC Berkeley, using the Hubble Space Telescope and the Keck II telescope, found that distant Type I supernovae in other galaxies were much dimmer than expected, according to the standard model of universal evolution.

In 2004, using the High-Energy Transient Explorer probe, Derek Fox at Penn State University and his research team found a gamma ray burst — an eruption of gamma rays a billion times greater than the Sun but lasting only a few milliseconds, originating in areas of space that do not seem to have Milky Way stars — and were able to photograph the “afterglow” of the phenomenon.

Also in 2004, the Mars rover Opportunity, run by JPL, discovered the presence of layered, cross-bedded rocks in a crater on Mars. Moreover, the rover also discovered small spherical rocks, as well as the mineral **jarosite**, an iron sulfate compound.

On or around Tuesday, November 15, go out in the evening (if clear) or use The Sky or a website (if not clear) and look at the eastern sky, and sketch Mars, the Moon (with phase) and the Pleiades in their proper orientation. Give the usual orientation and time/date of observation.