APOD
observing! tonight?
largest parallax: 0.77” for Proxima Centauri (~4ly)

smallest parallax from the ground: ~0.01 arc-seconds (~300ly)

smallest parallax: Gaia will measure stellar parallax down to 24 micro-arcseconds (~120,000 ly)
3D Map of Known Stellar Systems in the Solar Neighbourhood

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ESO PR Photo 03c/03 (13 January 2003)

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closest black hole is ~1600 ly away
closest supernovae remnant is ~600-800ly
closest cluster of young stars is ~400ly
closest extrasolar planet is ~15ly
the distance to the nearest star is about 40 million times larger than the radius of the sun

if the sun were a pebble, the nearest star would be in Baltimore
Measuring the Universe
Other Stars
Stars come in a wide range of sizes
The Sun is fairly typical (700,000 km) while some stars are only 1% (ie. Earth sized) as big and others that are hundreds of times larger (ie. the size of the orbit of mercury)
Luminosity depends on size $\times$ temperature. 

$L = 4\pi R^2 \sigma T^4$
more accurate picture...

- red dwarf
- red giant
- red supergiant
Sun size lecture tutorial
The smallest known stars are _____ times the radius of the Sun, while the biggest stars are _____ times the radius of the Sun

A. 0.01, 1000
B. 0.01, a million
C. 0.1, 1000
D. 0.1, a million
Brown dwarfs are a class of objects that are too small to fuse hydrogen in their core. They are all typically the size of Jupiter and they cool off as they get older. Suppose you found two brown dwarfs, one that is 10 Myr old and one that is 10 Gyr (1 Gyr = 1 billion years) old. Which is more luminous?

A. the older brown dwarf is more luminous
B. the younger brown dwarf is more luminous
C. they have the same luminosity because they are the same size
D. not enough information to answer this question
Stars also come in a wide range of temperatures
3,000 K
6,000 K
~30,000 K
stars come in a wide range of masses
low mass stars are much more common than high mass stars
Fundamental properties of stars:

- Radius: ranging from $0.01R_\odot$ to $1000R_\odot$
- Temperature: ranging from 300 to 30,000K
- Mass: as high as $\sim 100M_\odot$ down to ??

(Age)

(they have other properties, but these are the big ones)
10 solar mass stars are more common than 0.1 solar mass stars

A. True
B. False
Antares is a star whose radius is 500 times larger than the Sun, but whose temperature is only half as large.