

# ASTROPHYSICS SEMINAR SERIES

### "Measuring the Cosmos"

## Mark Reid CfA

#### Monday, December 3, 2012 Refreshments at 3:30pm in CAS 500 Talk begins at 4:00pm in CAS 502

#### Abstract:

Over 2000 years ago, Hipparcus measured the distance to the Moon by triangulation from two locations across the Mediterranean Sea. However, determining distances to stars proved much more difficult. Many of the best scientists of the 16th through 18th centuries attempted to measure stellar parallax, not only to determine the scale of the cosmos but also to test Heliocentric cosmologies. While these efforts failed, along the way they lead to many discoveries, including atmospheric refraction, precession, and aberration of light. It was not until the 19th century that Bessel measured the first stellar parallax.

Distance measurement in astronomy remained a difficult problem even into the early 20th century, when the nature of galaxies ("spiral nebulae") was still debated. While we now know the distances of galaxies at the edge of the Universe, we have only just begun to measure distances accurately throughout the Milky Way. Using the Very Long Baseline Array, we now can achieve positional accuracy approaching 10 micro-arcseconds! I will present new results on parallaxes and motions of star forming regions. These measurements address the nature of the spiral structure, size, rotation speed, and mass of the Milky Way.