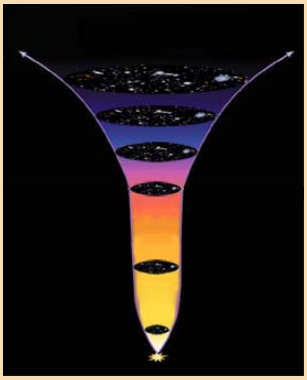
Origins of the Expanding Universe 1912–1932

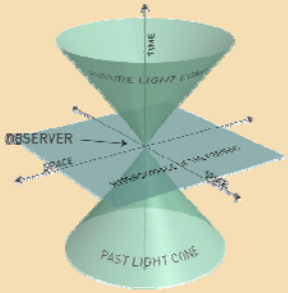
September 13–15, 2012
Lowell Observatory, Flagstaff, Arizona

On September 17, 1912, Vesto Slipher obtained the first radial velocity of a "spiral nebula" — the Andromeda Galaxy. Using the 24" telescope at Lowell Observatory, he followed up with more Doppler shifts, and wrote a series of papers establishing that large velocities, usually in recession, are a general property of the spiral nebulae. Those early redshifts were recognized as remarkable by Slipher, and were critical to the discovery of what came eventually to be called *the expanding Universe*. Surprisingly, Slipher's role in the story remains almost unknown to much of the astronomical community.

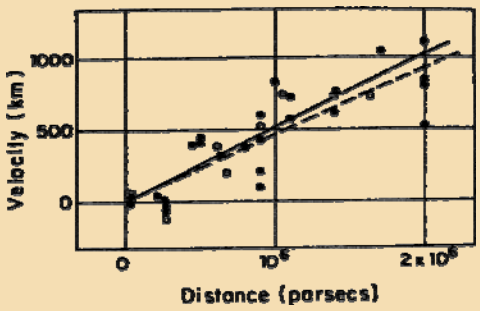
The nature, and especially the distance, of spiral nebulae was fiercely argued — most famously in the 1920 Shapley–Curtis debate. Hubble's 1923 discovery of Cepheids in Andromeda, along with Henrietta Leavitt's period–luminosity relation for Cepheids, led to a distance scale for the nebulae, enabling Lemaitre (1927) to derive a linear relation between velocity and distance (including a "Hubble constant" and, by 1931, a *Primeval Atom* theory).

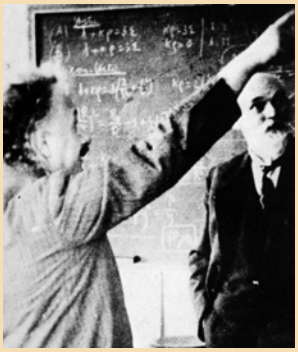


Meanwhile, a new concept of space and time was formulated by Einstein, providing a new language in which to understand the large-scale Universe. By 1932, all the major actors had arrived on stage, and Universal expansion — the most general property of the Universe yet found — acquired a solid basis in observation and in the (relativistic) concept of space. "Space expands"... or does it? How did Lemaitre and Hubble interpret this concept? How do we interpret it? It continues to evolve today, with cosmic inflation and dark energy presenting new challenges still not fully assimilated.



This 100th anniversary conference will bring together astronomers and historians of science to explore the beginnings and trajectories of the subject, at the place where it began.





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Further Information
jop@astro.columbia.edu & michael.way@nasa.gov

http://www.lowell.edu/workshops/slipher/