

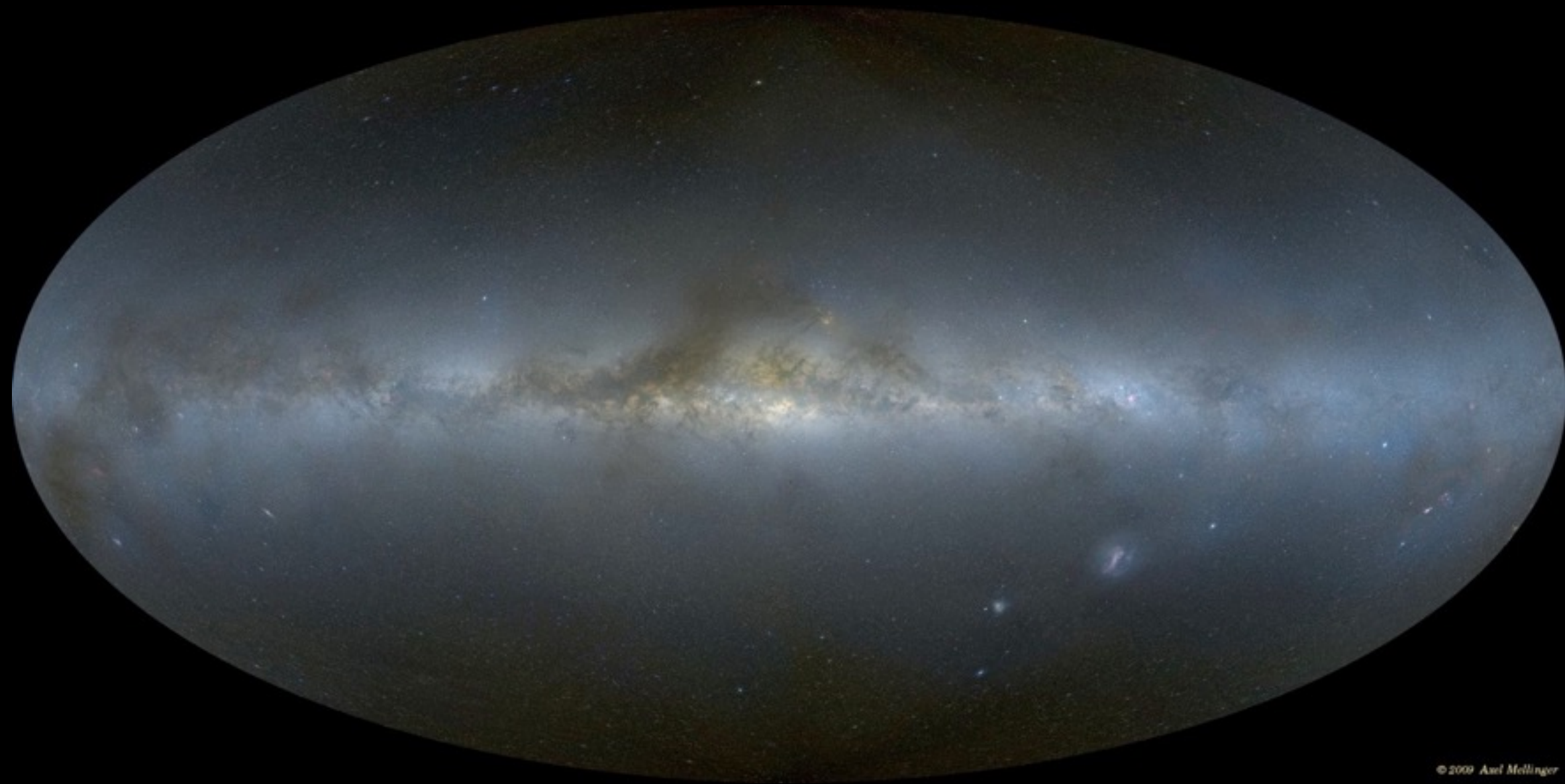


the distribution of stars
in the sky is not uniform



we live inside a flattened disk of stars: the Milky
Way Galaxy

Milky Way composite, seen from Earth's surface



Our neighbor galaxy: Andromeda



Andromeda: thought to be much like the Milky Way



corresponds to our location in the Milky Way

Our neighbor galaxy: Andromeda

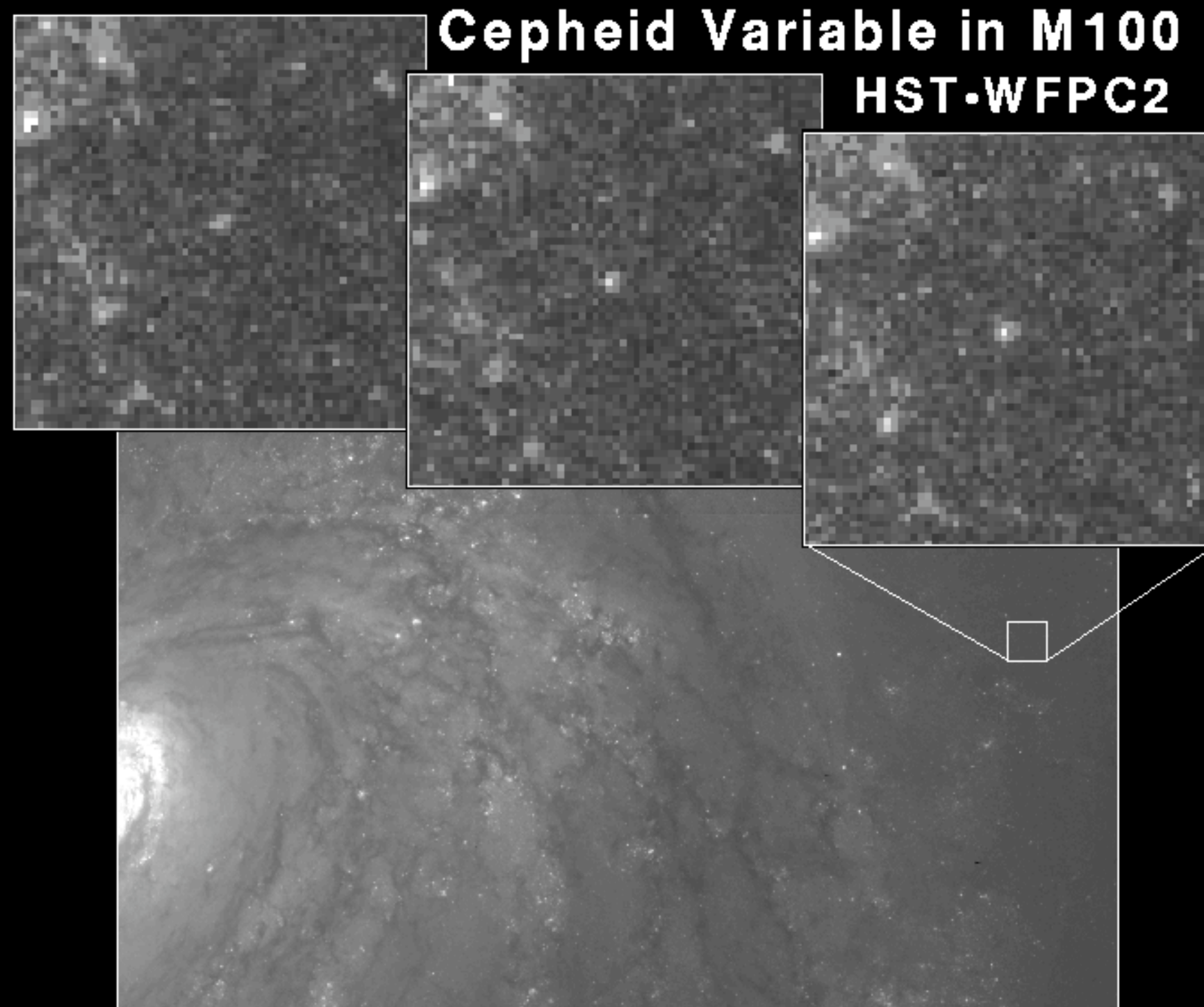
infrared view



The Whirlpool Galaxy (M51): grand-design spiral



characterization of individual stars in galaxies: starting around 1915

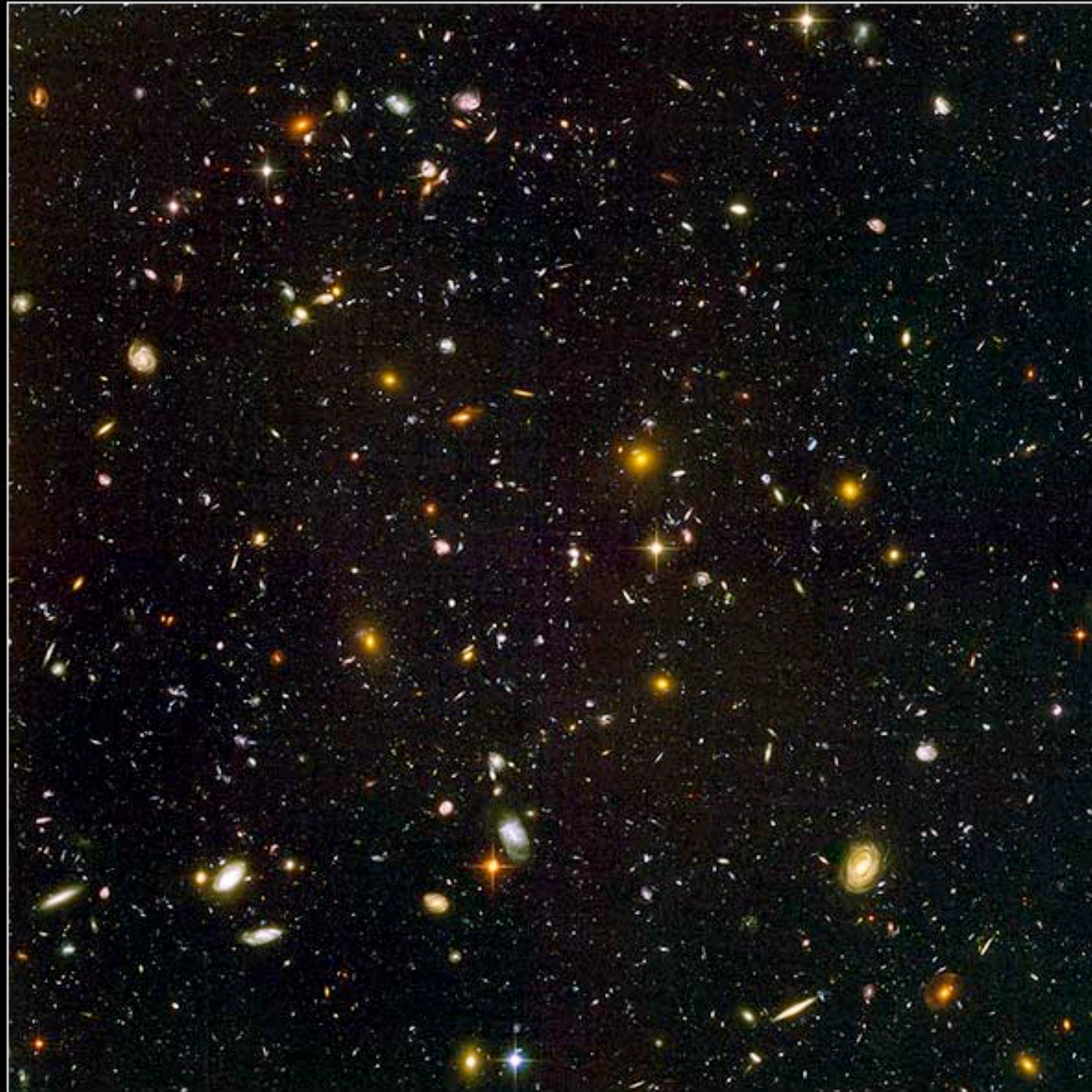


Virgo cluster: nearest big galaxy cluster



Virgo cluster: nearest big galaxy cluster



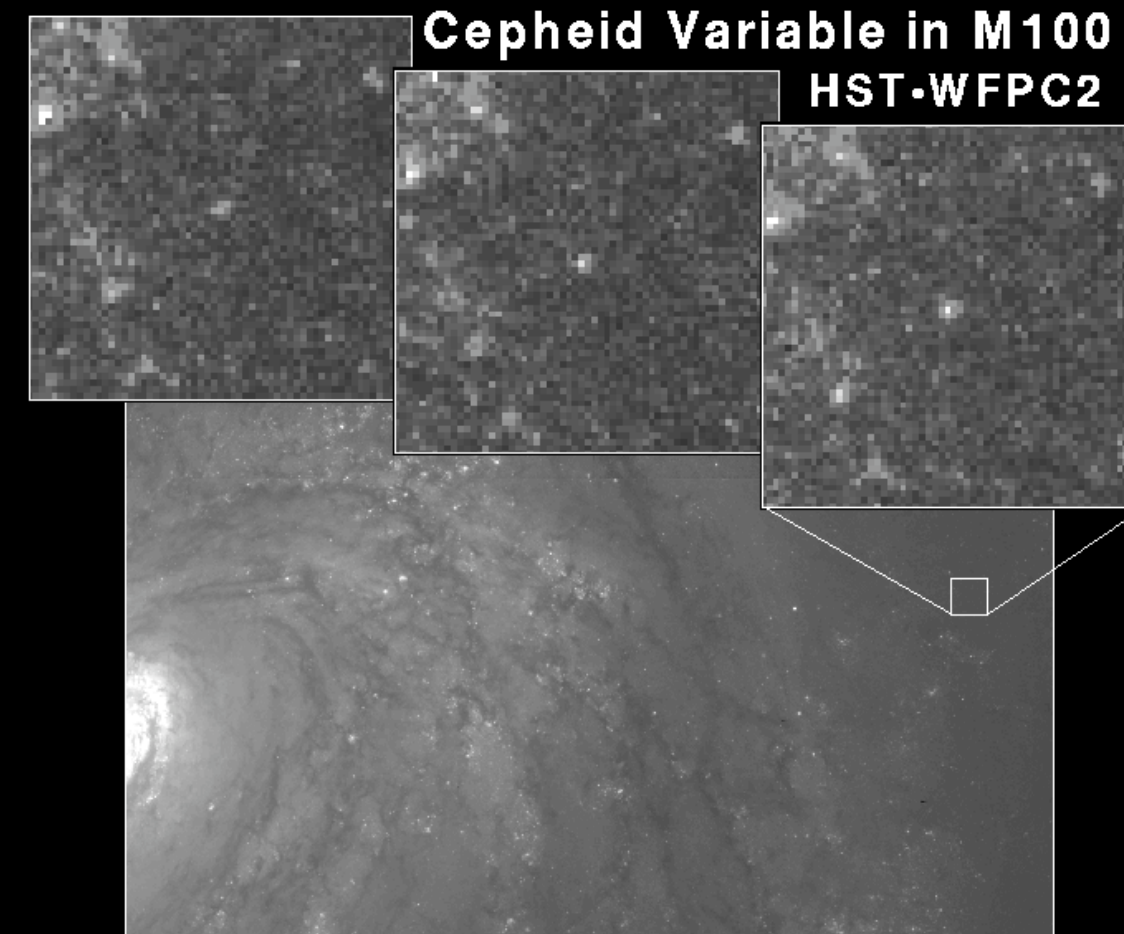


Edwin Hubble (late 1920s)



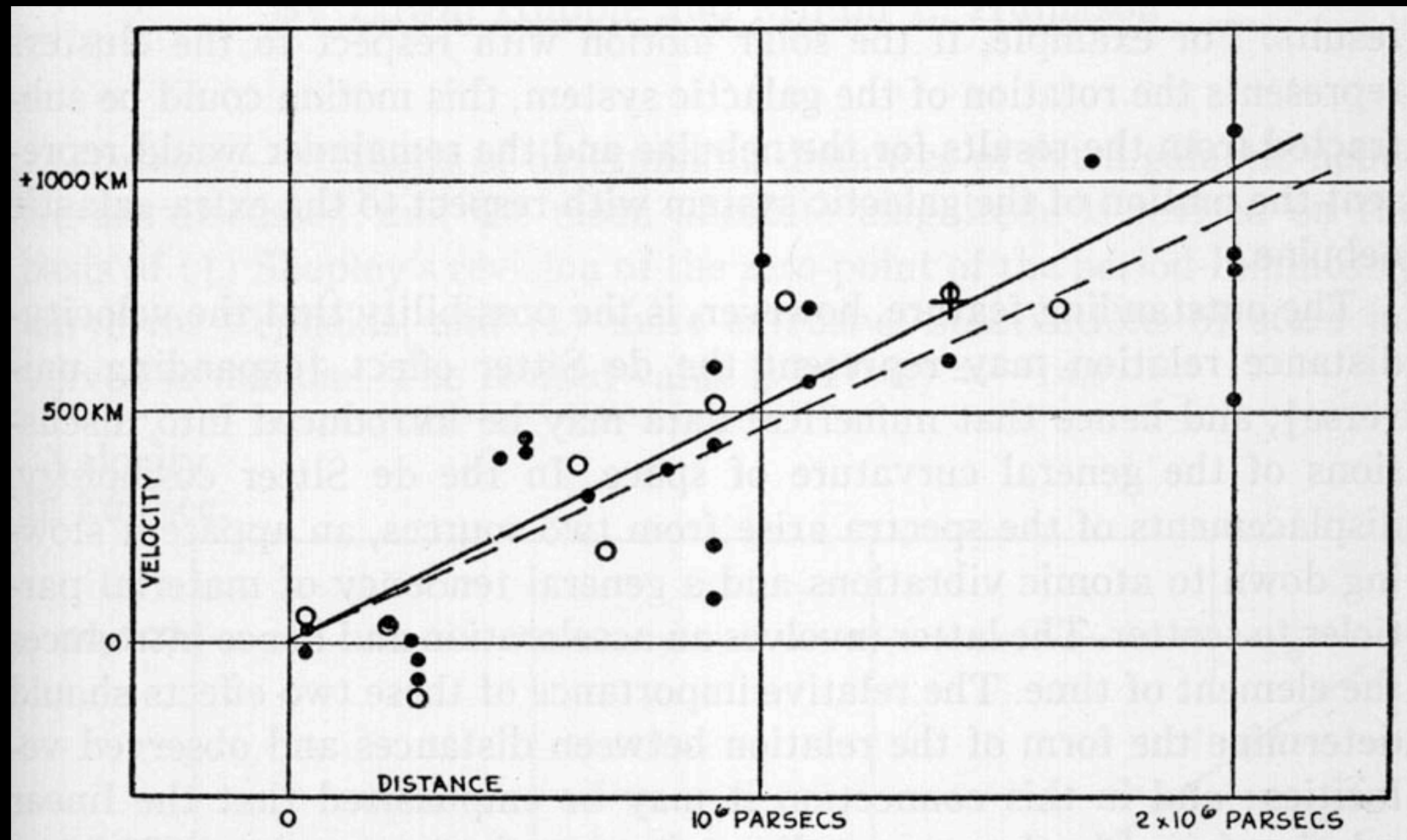
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Part of what made it possible to determine that Andromeda is a separate galaxy was the discovery of Cepheid variable stars by Henrietta Leavitt

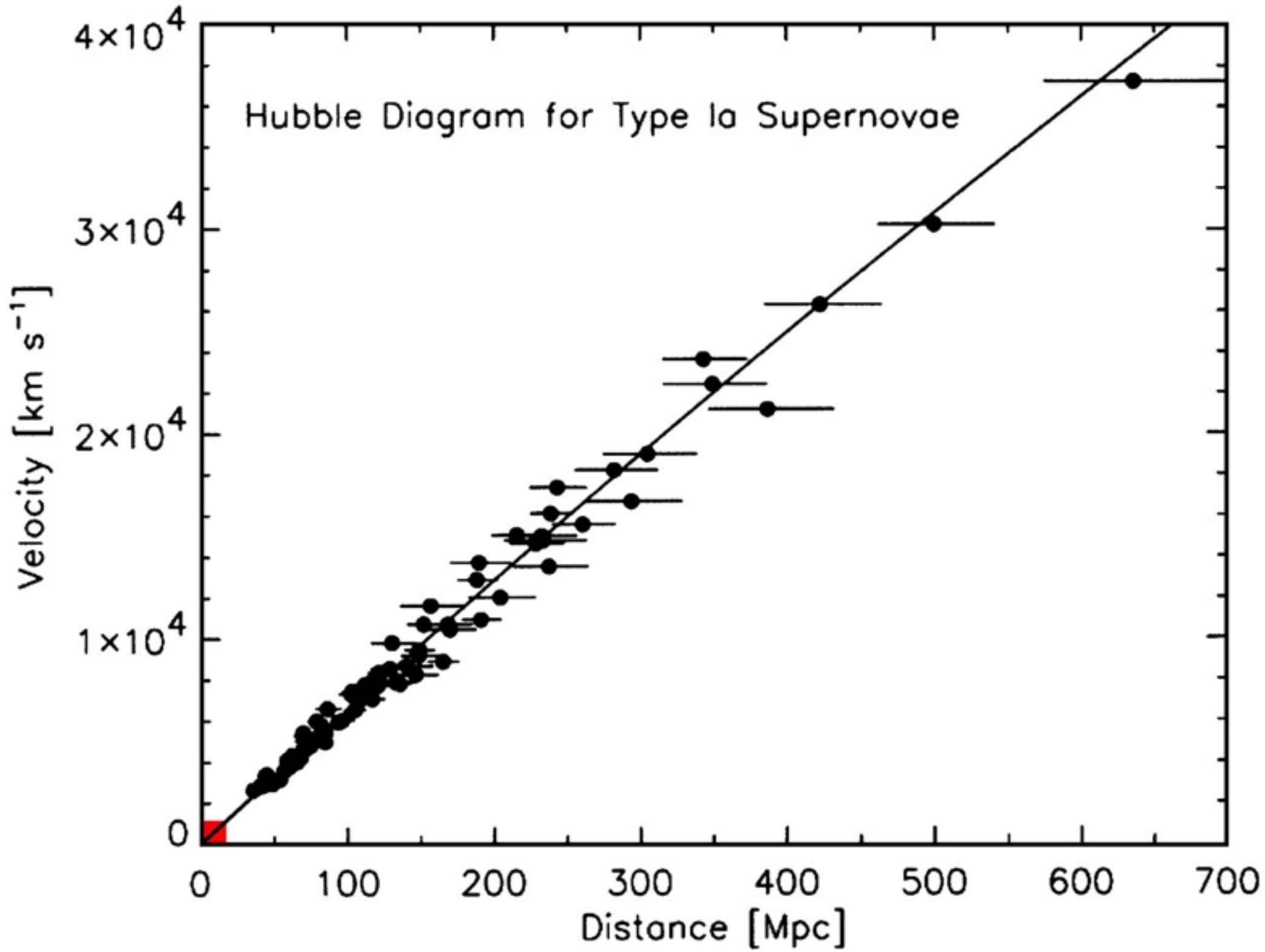


she also developed a clever method for using these variable stars as *distance* indicators

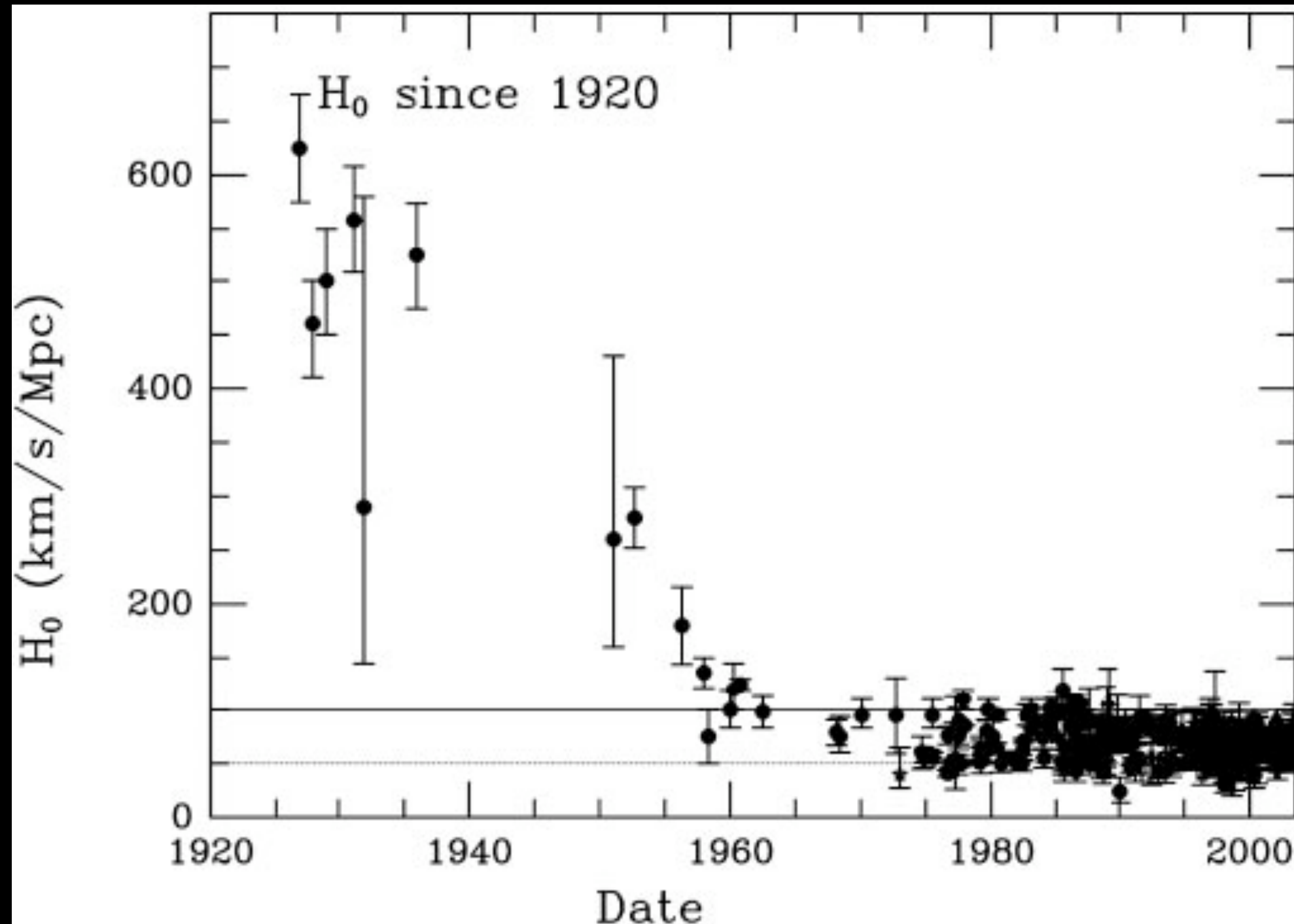
Hubble's original (1929) velocity-distance relationship



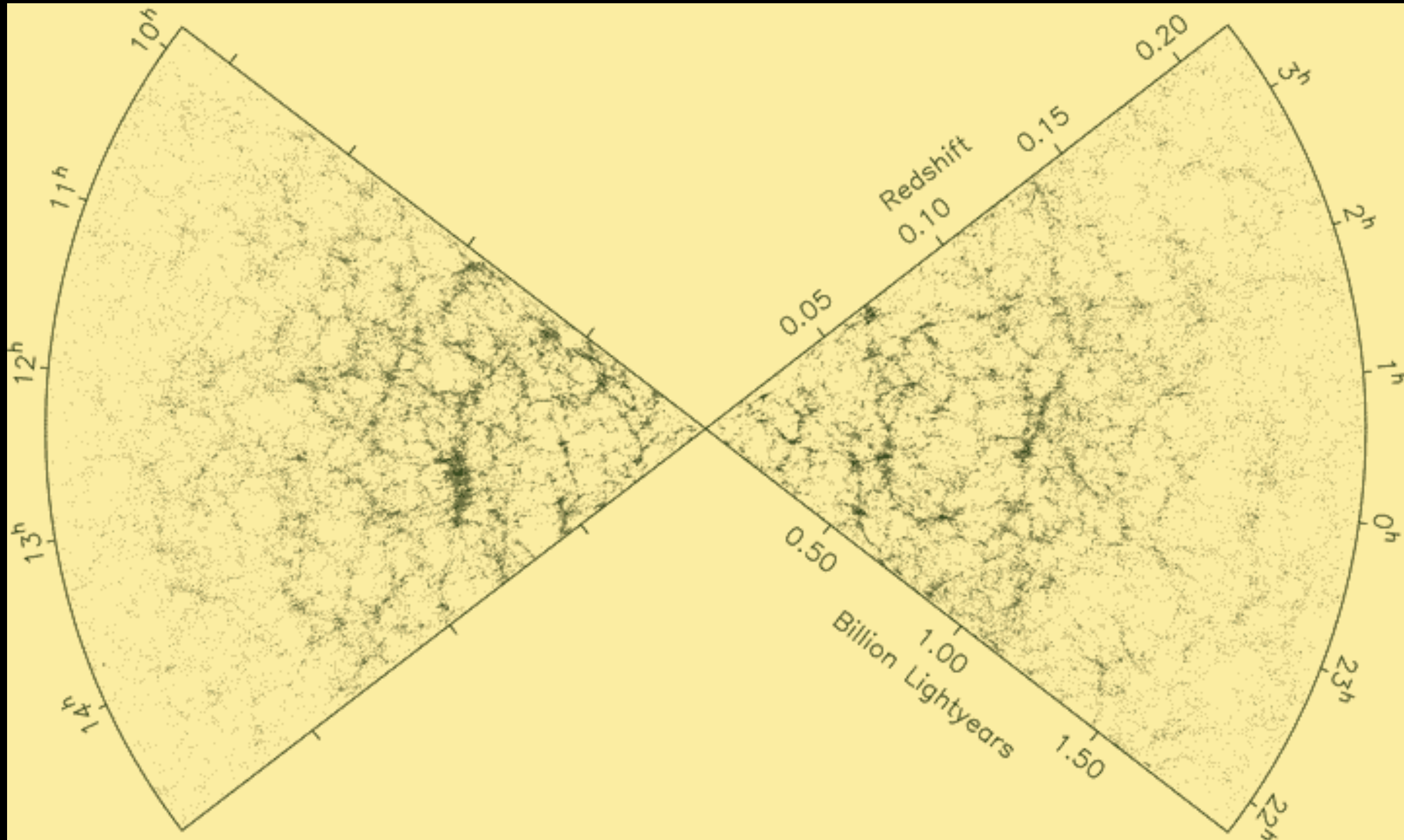
More recent Hubble diagram



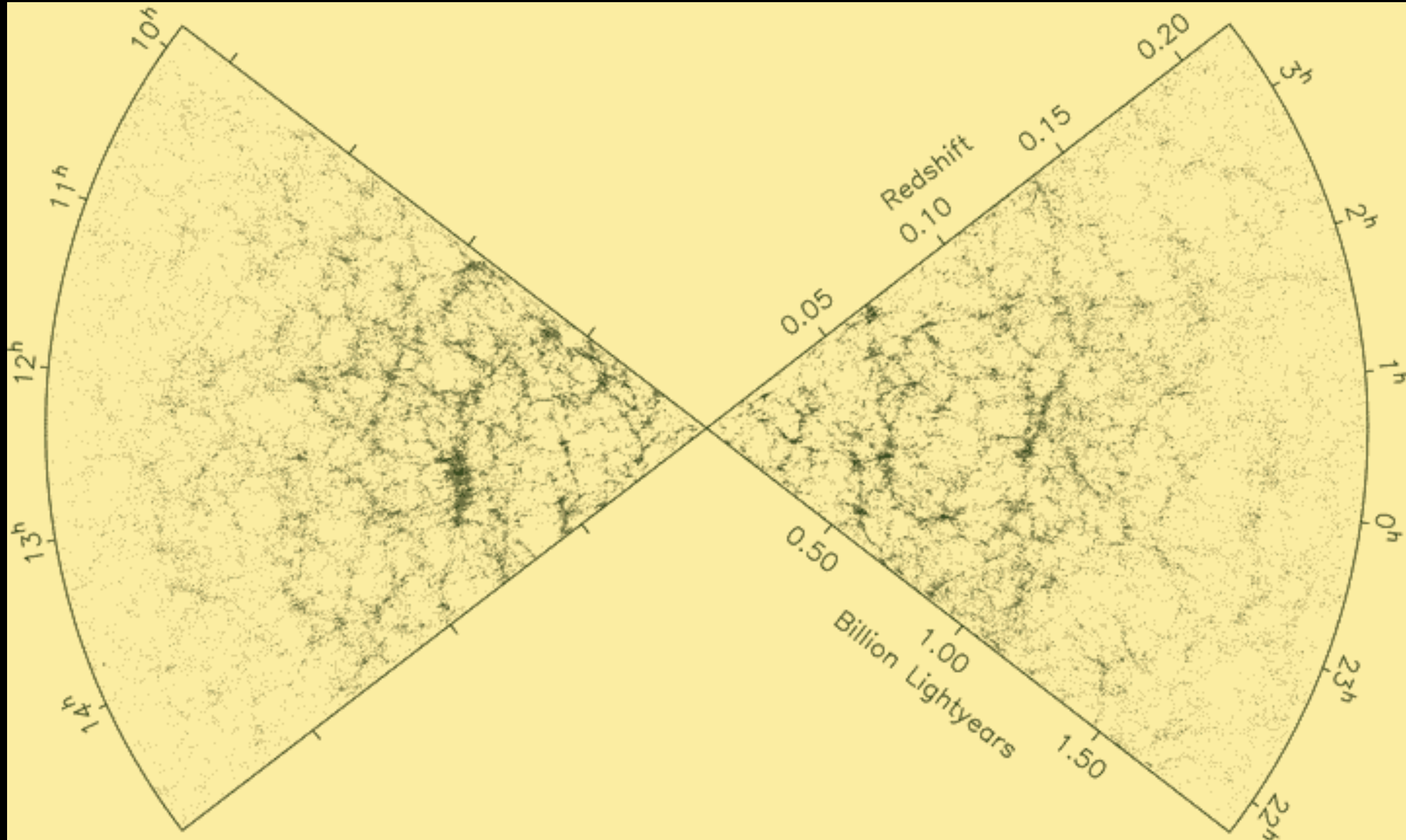
Hubble constant *determinations* over time



2df galaxy survey: each dot is a galaxy



there is a limit to the size scale of structure (~ 100 million light years)



Large scale structure simulation

zoom in

