

A geometric measurement of H_0 by the Megamaser Cosmology Project

Saturday, 10 September 2022 10:10 (20 minutes)

Water megamasers residing in the accretion disks around supermassive black holes (SMBHs) in active galactic nuclei (AGN) provide unique tools for bypassing the distance ladder and making one-step, geometric distance measurements to their host galaxies. The Megamaser Cosmology Project (MCP) is an international, multi-facility campaign to find, monitor, and map such AGN accretion disk megamaser systems, with the goal of constraining the Hubble constant to a precision of several percent. To date, the MCP has surveyed over 4000 active galactic nuclei for signs of 22 GHz water maser emission, resulting in the discovery of nearly a hundred new megamaser systems (constituting approximately half of all known such systems). 20 of these new systems have been mapped with the VLBA, providing “gold standard” black hole mass measurements, and 10 of them have been extensively observed with both multi-year spectral monitoring and deep VLBI mapping observations for the purposes of making distance measurements. The MCP measurements currently constrain the Hubble constant to 73.9 ± 3.0 km/s/Mpc independent of distance ladders, the cosmic microwave background, and gravitational lenses, corroborating prior indications that the local Hubble constant exceeds the early-Universe prediction.

Presenter: Dr PESCE, Dominic (Center for Astrophysics | Harvard & Smithsonian)