

High redshift starburst galaxies revealed by SPT, ALMA, and gravitational lensing

Recent facilities such as the South Pole Telescope (SPT), the Herschel Space Observatory, and the Atacama Large Millimeter Array (ALMA) have opened a window to the millimeter (mm) sky and revealed a unique and unprecedented view of the Universe.

In a 2500 square degree cosmological survey, SPT has systematically identified a large number (>100) of high-redshift strongly gravitationally lensed starburst galaxies. We have conducted a unique spectroscopic redshift survey with ALMA, targeting carbon monoxide line emission in the direction of extraordinarily bright millimeter-wave-selected sources. 40% of these sources lie at $z > 4$, indicating the fraction of dusty starburst galaxies at high-redshift is far higher than previously thought and demonstrating that large reservoirs of molecular gas and dust can be present in massive galaxies near the end of the epoch of cosmic reionization. We are undertaking a comprehensive and systematic followup campaign to use these "cosmic magnifying glasses" to study the infrared background in unprecedented detail, inform the condition of the interstellar medium in starburst galaxies at high redshift, and place limits on dark matter substructure. I will discuss the scientific context and potential for these strongly lensed starburst galaxies, describe our team's latest science results, and discuss plans for future instrumentation and facilities.