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OH Masers at Cosmic Noon: a unique probe of galaxy mergers and evolution at a 10-billion year look-back time

Abstract

OH Megamasers are a powerful probe of galaxy mergers and evolution that can serve as a signpost for intense star formation driven by major mergers. However, a statistically significant sample of OH Megamasers is currently restricted to z~ 0.25, limiting their potential power as an independent constraint of the cosmic merger rate of galaxies, and a high-redshift marker of the starburst and AGN activity that those mergers trigger. To address this, we propose UHF observations of six strongly-lensed z~1.5-1.8 Herschel-ATLAS-discovered ULIRGs to increase the OH main line redshift frontier by a factor of 3-4. For a modest integration time per source, we estimate high signal-to-noise detections (>20-sigma in 7 independent channels), assuming the correlation between OH to far-infrared luminosity holds at higher redshift. Non-detections will provide strong evidence that ULIRGs at high-redshift do not have the same masing conditions as in the local Universe, which would be a challenge and important result to reconcile. These expected high-SNR detections will represent the highest spectroscopic detections of any objects with MeerKAT, demonstrating its power to make seminal contributions to understanding galaxy evolution within the epoch of peak of star formation and AGN activity.