Cosmology using Strong Lensing with H-ATLAS: The first steps towards a 1000-lens sample

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Abstract

Gravitational lensing promises to be an important tool for cosmology. For example, an unbiased sample of 1000 lenses could determine Ω_Λ with an error of 1%, similar to the state-of-the-art Planck and supernova surveys. However, currently the largest sample contains less than 100 lenses. A shallow, 550 square degree, far-infrared survey by Herschel (H-ATLAS) revealed a large number of potentially lensed sources, possibly allowing us to realise an unbiased 1000-lens survey. To test this possibility, we are investigating the brightest, high-redshift H-ATLAS sources, which have luminosities typical of lensed galaxies. We have observed 217 out of 236 sources at 850 μm with the SCUBA-2 instrument on the James Clerk Maxwell Telescope (JCMT). These observations will provide better estimates of photometric redshifts, and in turn, of luminosities. We determine the probability that the sources are lensed by by comparing their luminosities to the expected luminosity functions. We will present the results of this project, and describe our current plans towards a 1000 lens sample, which might provide a low-cost and complementary method to constraining the cosmological parameters.