

BEARS with SALT

Stephen Serjeant, 11 November 2021

Motivation

We request funding to support our ongoing large follow-up programmes of the brightest submm galaxies on the sky from Herschel. We are leading the **Bright Extragalactic ALMA Redshift Survey (BEARS, 91.6hr on ALMA)** that has yielded spectroscopic redshifts of 71 bright submm galaxies in the Southern hemisphere (Urquhart+21), and the Z-GAL NOEMA redshift campaign (co-Is Serjeant and Marchetti) in the North has brought the all-sky total to over 200 redshifts. These data have rich prospects for science exploitation and follow-ups, probing the drivers of the fuelling of star formation and its consumption into stars to form the most massive present-day galaxies. Dr Lucia Marchetti (UCT) has HST data for many of our BEARS and Z-GAL galaxies, and has obtained SALT spectroscopy for many BEARS galaxies.

Activities and Expected Outcomes

Depending on the interests and technical background of the visitor, and the duration of the visit, we would like e.g. (a) to try lens modelling of these systems (b) to make headway in the optical spectroscopy reduction and look for hints of optical lines that match the CO redshift (c) to stack the optical spectra at the ALMA/NOEMA source redshift to see if we can say anything statistical about eg [OII], Hbeta, [OIII] etc in the background sources (d) to search the ALMA data (or stack it) for lines at the redshift of the lens, etc. We will seek additional UK funding from the visitors' line in our STFC Consolidated Grant and other sources.

Aims / Goals

- Determine the halo masses of foreground gravitational lenses, measure the halo:stellar mass ratio, and thereby constrain galaxy evolution models
- Search for any evidence of dark matter halo substructure in the foreground system and thereby make a fundamental cosmological constraint
- Compare the morphologies of dust and optical emission in the background system and thereby constrain physical processes in high-redshift ultraluminous starbursts
- Search for optical emission lines at the same redshifts of our CO submm galaxies (including stacking) and thereby constrain the integrated obscuration in high-redshift ultraluminous starbursts