

UCAT Summer Student Program:

Observing the gas content of distant galaxies with submillimeter interferometers

Supervisors:

Primary supervisor: **Prof. Sébastien Foucaud** (NTNU, Department of Earth Sciences)

Secondary supervisor: Prof. Yasuhiro Hashimoto (NTNU, Department of Earth Sciences)

Project description:

Composed by billions of stars, large amount of gas, dust and dark matter, galaxies are fascinating objects, subject of beautiful pictures but also a real challenge for astronomers that want to understand their history. Despite detailed optical and near infrared observations over the past 15 years, theoretical models still have difficulty explaining the formation of galaxies in details. The key to resolve this problem is to identify the main physical processes responsible for the global reduction in star-formation activity observed in galaxies during the last 7 billion years of the evolution of our universe, epoch when they were forming new stars with much higher rates than today.

The one major missing observational ingredient for understanding galaxies is their directly observed gas content, which can be probed with CO molecule observations. CO observations of galaxies with submillimeter interferometers, such as ALMA, is a critical way to obtain gas mass fractions, determine how the star formation rate depends on gas density, provide a new avenue to measure kinematics and masses for galaxies, as well as probe possible outflow/inflow signatures in the inner part of the galaxies as well as in the intergalactic medium.

We propose with this project to use a unique dataset from the SubMillimeter Array (SMA), a USA/Taiwan Interferometer in Hawaii, and trace CO molecules of massive galaxies when our Universe was only half of its current age.

Preferred background of student candidates:

- Senior or Junior students with good English skills are both welcome.
- Background knowledge in astronomy is essential.
- Strong knowledge/experience in computers (linux system) is highly desirable.