Measuring the Redshifts of Distant Bright Galaxies

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Abstract

We present CO observations obtained toward two high-redshift galaxies, USS1558, which is a z=2.53 radio galaxy located at the center of a proto-cluster of Hα emitters (HAEs), and J1344, which is a Herschel detected bright source with previously unknown redshift. Both are observed with the Nobeyama 45m telescope, and carried out as part of our large high-z legacy survey. The final goal of this survey is to derive redshifts from bright submm selected galaxies. The high sensitivity and wide frequency coverage capabilities offered by ALMA will allow us to routinely measure the redshifts of high redshifts sources. In addition, the sub-arcsecond resolution images will allow us to not only identify the exact optical/NIR counterparts of the submm galaxies, but it will also allow us to study their sizes and kinematics of the molecular/atomic gas which will ultimately provide us with hints on the formation mechanism of these early galaxies.

1 Introduction

It is known that the cosmic star formation rate increases as a function of redshift with a peak at z = 1-3. Submm galaxies (SMGs) are sources located at these redshifts and thought to be the precursors of massive elliptical galaxies seen in the local universe.

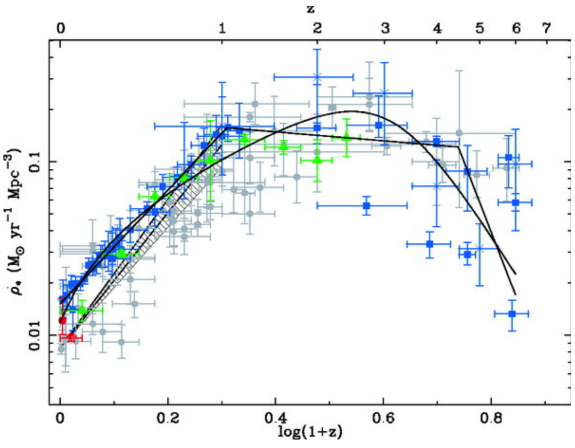

Fig. 1 (Hopkins and Beacom 2006)

The origin of the bright submillimeter emission is the reprocessed emission from the interstellar dust particles surrounding the young star forming regions/or an AGN. While there is evidence for AGNs in a good fraction of the SMGs, the bulk of the infrared light for the high-redshift submm population is still thought to be dominated by star formation. Many of the brightest SMGs are likely significantly magnified by gravitational lensing effect.

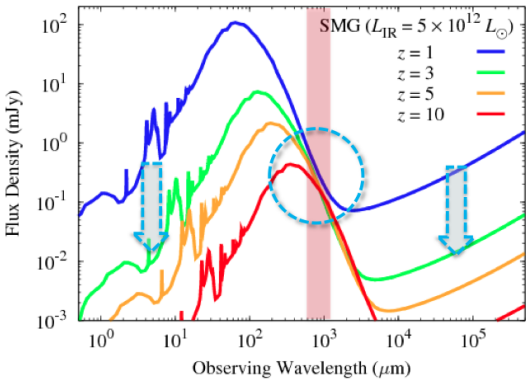

Fig. 2 SED of active star-forming galaxies

2 Characteristics

This target in USS1558 is proto-cluster, where an over-density of massive, red-sequence galaxies has been discovered around a radio galaxy. So extremely high number density of star-forming galaxies in the USS1558 proto-cluster also supports that they may be evolving through multiple merger events (K. Tadaki+ 2014).Initial target is central radio galaxy in USS1558.

J134429.4+303036 is a strongly lensed galaxy in a cluster discovered inHerschel-ATLAS. The strong lenses identified via (sub-)millimeter surveys will provide a wealth of information regarding the astrophysics of galaxy formation and evolution. (Bussmann et al. 2011)

3 Methods/Instruments and Observations

We observed USS1558 and J1344 using the two-SB, two-polarization receiver system of TZ1 and TZ2 equipped on the Nobeyama 45mtelescope. We can show the objects with large velocity and obtain multi-transition lines. Table.1 is beam size, used receiver, Tsys and observing season when observed them, are show below this.

Sumple	Beam sise	Receiver	Tsys	Observing season
USS1558	15″ – 19″	TZ1 and TZ2	100 – 250 [K]	2012-2013 winter
J1344				2013 winter

Table. 1

4 Results

Data reduction was pursued using the facility date reduction application Java-NewStar. Since the 45m pointing accuracy is significantly affected by wind, only the data taken with wind velocity less than 5 m/s were used. In addition, we flagged scans with visually poor baselines in the data, and a zeroth order baseline is subtracted from each spectrum by eye (Iono et al. 2012). As a result of the analysis, these objects could not be detected. but we assume the 3σ upper limit from T_{sys} obtained as a result of the analysis, and evaluated the luminosity and the redshift.

5 Discussion/Conclusion and Future Work

It is supposed that according to the factors that can not be detected is observation instrument, also be mentioned that it is dependent on the weather and that the integration time was not enough.Possibly these objects may be easy to detect, if we observe its at 4,200m such as ALMA.

In the case we observed this observation in ALMA Band3, we shorten observation time very much. We set baseline of 450m and give some parameters when we observe its as follows, using the ALMA OT Cy2. Observation time is sufficient in less than 20 minutes.

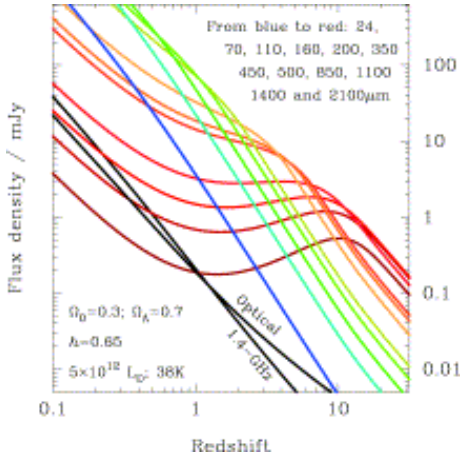

Fig. 3 (Blain et al. 2002)

We tested two-objects this time, to do blind search for high-redshift. The left panel shows that submm

of the 850 μ m degree keeps enough flux in the domain of high-redshift, and can become one hint that can understand some states of the galaxies formation history of each time.