

NAOJ ALMA Scientific Research Grant 2020

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■ Title

ALMA HzFINEST : High-z Far-Infrared Nebular Emission Studies

■ Summary

ALMA observations for nebular far-infrared [OIII] and [CII] lines as well as dust continuum have revolutionized the research field of galaxy formation and reionization. An example is the record-breaking emission line redshift of $z=9.11$. Some other interesting features of high- z galaxies such as a high [OIII]/[CII] ratio, rotational motion and extended emission halo have been observed so far. For further exploration of the redshift frontier beyond the reionization epoch, this program aims at the three goals: (1) to construct a statistical sample of galaxies at $z>7$ (including a new redshift record of $z>11$) observed in both [OIII] and [CII], (2) to examine morpho-kinematics of these galaxies and (3) to explore CO and [NII] as new probes. Furthermore, we will send the most interesting subset of the galaxies to JWST follow-up for rest-frame UV/optical emission lines. The spatially resolved full information of the ISM in the highest- z galaxies will bring a breakthrough to our understanding of galaxy formation physics.