X23a A constraint of [NII] 122 μm and a new dust continuum detection of a z = 7.15 Lyman Break Galaxy with ALMA

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The high sensitivity and high spatial resolution of ALMA has been providing new observational information about the ISM properties of galaxies in the reionization epoch. We present the latest ALMA Band 7 observational results for a Lyman break galaxy at $z = 7.15$, B14-65666, which is the first object detected in all [OIII] 88 μm, [CII] 158 μm, and dust continuum emission at $z \gtrsim 6$ ("Big Three Dragons", Hashimoto et al. 2019). The latest observation targets the [NII] 122 μm emission line and the underlying dust continuum emission. While the dust continuum is detected with S/N ~ 18, the [NII] emission line is not detected and is constrained with the stringent upper limit. Given the [OIII] detection and [NII] non-detection, the galaxy seems not to have a high nitrogen-to-oxygen abundance ratio. The dust continuum flux densities at 90, 120, and 160 μm are not well explained with modified black-body radiation with a single dust temperature. Therefore, as B14-65666 consists of two components, we assume two dust temperatures with a fixed dust emissivity index β. Our fitting results favor different dust temperatures of the two components with $\beta > 1$, albeit with large errors.