

X26a

A protocluster at $z = 2.5$ II. ISM properties revealed by ALMA

Minju Lee, 川邊良平 (東京大学/国立天文台), 河野孝太郎, 田村陽一, 梅畑豪紀, 斉藤俊貴 (東京大学), 兒玉忠恭, 田中壱, 伊王野大介, 中西康一郎, 廿日出文洋 (国立天文台), 但木謙一 (MPE)

Followed by the talk presented in ASJ2014b that reported early results from a deep JVLA observation at 10 cm, we present our recent results obtained by ALMA (1.1 mm continuum and CO(3-2)) toward a protocluster at $z = 2.5$, 4C23.56. Revealing properties of protocluster members is crucial in understanding structural formation as well as the galaxy evolution under the certain circumstance of overdensity in the early Universe. Our target field 4C23.56 was identified with overdensities of HAEs that are detected by narrow band filter technique with Subaru (total number of 25), and the follow-up SMGs survey with ASTE/AzTEC at 1.1 mm revealed some overlaps with them but with coarse resolution ($\sim 30''$). Our high resolution ($0''.7$) imaging at 1.1 mm with ALMA has allowed direct counterpart searching with the line emitters and we confirm 4 HAEs with 1.1 mm continuum detection among 19, above 3-sigma ($=0.3$ mJy), while for CO(3-2) with , we detect seven (out of 22 targeted) HAEs confirming the redshift of them at $z=2.482-2.488$. We estimate the ISM mass fraction (f_{gas}) and star formation efficiency (SFE) with the help of stellar mass and SFR estimation in the shorter wavelengths, and we find relatively low f_{gas} ($\sim 25\%$) but high SFE ($\tau_{\text{depl.}} \sim 100$ Myr) for detections. We discuss that these would be the results perhaps due to the enhanced merger events at such overdense region, provided their disturbed morphologies and the kinematics.