X15a **Various Molecular Gas Responses toward the Mid-stage Merger VV114**

T. Saito(UT), D. Iono(NAOJ), M. S. Yun(Umass), D. Espada, Y. Hagiwara, M. Imanishi, K. Nakanishi, H. Sugai(NAOJ), K. Motohara, K. Tateuchi, J. Ueda(UT), and R. Kawabe(JAO)

We present high resolution CO(1-0), ^{13}CO(1-0), CH_3OH(2-1), CS(2-1), CN($1_{1/2}$-$0_{1/2}$), CN($1_{3/2}$-$0_{1/2}$), CO(3-2), HCN(4-3), HCO^+(4-3), and CS(7-6) maps of an IR-bright late stage merger VV114 obtained during cycle 0 of ALMA. The dense gas ($> 10^6$ cm^{-3}) traced by HCN(4-3), HCO^+(4-3) and CS(7-6) clearly identify the highly obscured AGN and intense starburst activities at the overlap region, where a merger-induced star-forming region is predicted from numerical simulations. On the other hand, the CO(3-2)/CO(1-0) ratio demonstrates moderate dense gas ($> 10^3$ cm^{-3}) content relative to the total molecular gas. Furthermore, the CO(1-0)/^{13}CO(1-0) ratio increases toward the central region, where the gas is warmer and denser. This trend is consistent with HCN(4-3), HCO^+(4-3) and CS(7-6) emissions. We use the radiative transfer code RADEX to reveal the entire gas response relative to the star formation, and also derive the gas conditions from CN, CS, and CH_3OH lines. These 10 line analysis suggest that each clump in VV114 has a different physical condition, affected by the AGN, intense starburst activities, or merger-induced tidal force. These ALMA data demonstrate the importance of observing both the diffuse and dense gas in order to obtain a comprehensive view of the physical processes that occur during a major merger event.