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Presentation Requested: oral
Category: Assembly of Galaxies / Mass & Structure Evolution
Question: What are the most recent advances in submillimeter detected galaxies? Now that ALMA offers the possibility for resolving them what have we learned about their sizes, gas fractions, distribution of gas, dust and stars.

Morphology of the Warm Molecular Gas in Arp 220 as Revealed by ALMA

Herschel observations of nearby star-forming galaxies have determined that the warm (high pressure) component of the molecular gas, traced by high-J CO lines, dominates the luminosity and hence the energy budget. Our high spatial resolution ALMA (Cycle-0) observations of the CO J=6-5 line in Arp 220 resolved the morphology of the warm molecular gas on a much finer scale than previously, revealing interesting and unexpected features in the morphology of the warm component: The CO emission from the two nuclei is clearly resolved and the peaks of the warm gas emission are not coincident with either the peaks of the dust continuum emission or the maximum velocity dispersions. Moreover, CO is also detected in absorption at high velocities. There is evidence of an outflow in the eastern nucleus. Highly excited SiO J=16-15 is detected in absorption but only towards the western nucleus. None of these features were previously detected in the cold molecular gas maps of CO J=2-1 and 3-2 or in the lower-resolution CO J=6-5 map. Further, the continuum observations show that the dust emission is significantly more compact than the molecular gas. The western nucleus is revealed to contain warm, optically thick (T = 80 K, $\tau_{435} = 4.3$) dust, while the eastern nucleus is cooler (58 K) and relatively less opaque ($\tau_{435} = 1.5$). The two nuclei combined account for 14-28