

## ALMA Observations of the DART Mission: Characterizing the Impact Ejecta at Sub-Millimeter Wavelengths with ALMA

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### ABSTRACT

The highly successful Double Asteroid Redirection Test (DART) impact represented a critical step forward in planetary defense. The impact liberated a spectacular plume of ejecta that continually evolved on timespans of hours to days. We conducted observations with the Atacama Large Millimeter Array (ALMA) toward the DART impact ejecta from roughly three to eight hours post-impact using the Band 7 receiver centered near 345 GHz. These observations sampled continuum emission from millimeter-sized grains in the ejecta at high sensitivity, characterizing the evolution of the ejecta across our observations, while simultaneous spectral line observations constrained the abundances of silicon- and sulfur-bearing gas-phase species. Pre-impact continuum observations provided the first measure of Didymos' millimeter spectral emissivity, revealing highly complementary surface properties information for comparison with the handful of asteroids measured at millimeter/sub-millimeter wavelengths. We will discuss our results in the context of the DART mission objectives and will place our measurements into context with compositional measurements of the larger asteroid population. This work makes use of the following ALMA data: ADS/JAO.ALMA #2021.A.00013.S.