



Atacama Large Millimeter/submillimeter Array  
IN SEARCH OF OUR COSMIC ORIGINS



# Charge 1: Total Power Continuum

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- Systematics limit sensitivity of total-power continuum observations (see slides by Eric Villard)
  - RMS is  $\approx 10x$  higher than thermal
    - implies  $\approx 100x$  longer integration times
  - implies the time multiplier between the 7-m and the Total Power arrays will be  $\sim 170$  (for continuum) instead of 1.7 (for spectral line)
- Additional modulation techniques could in principle improve continuum sensitivity by a factor of  $\approx 2x$ 
  - hardware not available and will need to be purchased, installed, and tested
- Even with improved techniques, integration times for total power continuum will be  $\approx 50$  times the 7-m array integration time (versus 1.7 for total power spectral line)
  - Total power continuum observations therefore will detract significantly from time available for total power spectral line observations and use of the total power antennas in the baseline array

- What are the critical science cases that require total power continuum?
  - Can the observations be realistically carried out with the current performance?
  - Can other telescopes (e.g., APEX) in principle provide the single-dish continuum for these science cases instead?
- Assume that it takes  $\approx 30$  times ( $= 50 / 1.7$ ; see previous slide) longer to get total-power continuum data than total-power spectral-line data with the appropriate time multiplier. Is this the best use of the Total Power array scientifically relative versus (for example):
  - total power spectral line observations?
  - using the total power antennas with the the 7-m array for high frequency calibration?
  - using the total power antennas in the baseline array?