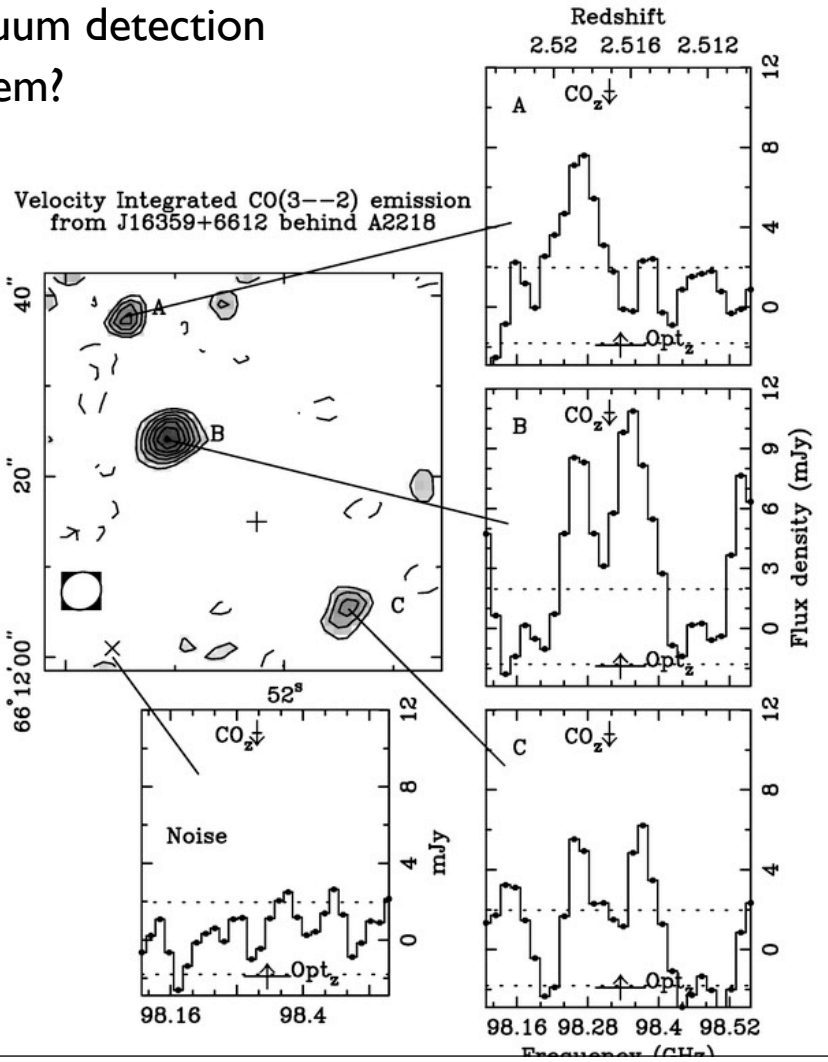
Early Science Example: Garden Variety Submm Galaxies

BACKGROUND:

Majority of submm galaxies have $F_{850\mu m} \sim 1$ mJy - below the confusion limit for typical single dish telescopes

- Lensing is one way to study these galaxies
- Example with OVRO (53 hrs on source) - no continuum detection
  - Double horned profile - ring/disk or merging system?
  - 1--4 Jy km/s or ~10 mJy in a 50 km/s channel

□ Science Goal for ES: you could resolve the source and determine if it is a single object or merging pair?



- Band: Let's choose 3mm (most common weather) and CO (3-2) line is redshifted into this band

- Rms: 0.67 mJy per channel where channel is 50 km/s wide requires ~1 hr of integration with 16 antennas in ES. This rms sensitivity is the same as what was achieved with OVRO in 53 hrs of integration.

- Configuration / Resolution:
  - Previous observations ~ 4"
  - Now we want to resolve the source. So would like to get to a resolution of ~1" or better (8 kpc or better).

  - The flux of the source per beam element will decrease as we go to higher resolution.

  - Therefore to reach the same S/N in a channel we would need to go integrate for longer.

  - Noise goes down as 1 / sqrt(time). So to improve the noise by a factor of 10 would require a 100x longer integration.

  - Users will need to make an argument for what the expected flux of the source would be in such a case. SHOULD WE GIVE THEM an example of how we might do this? i.e. guesstimate the reduction in the signal here?