

## Stating the Obvious

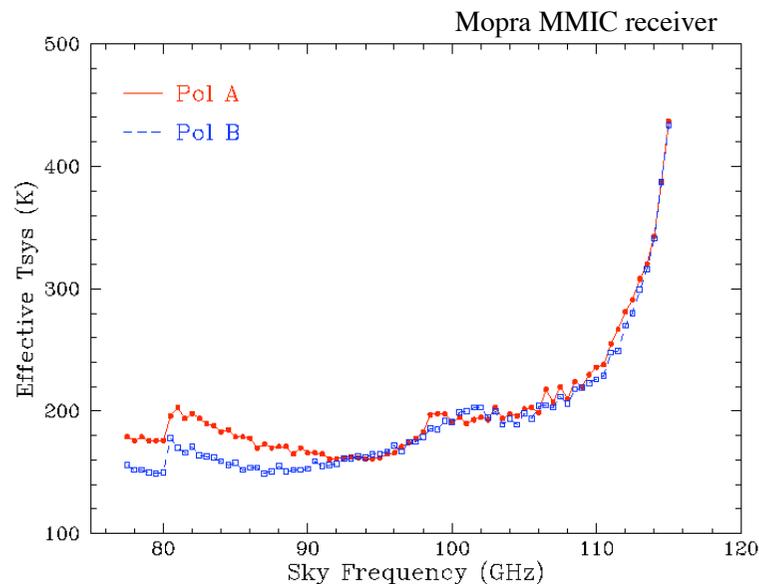
### ATCA 115 GHz upgrade

Tony Wong

30 November 2005

Thanks to: G. Carrad, G. Moorey

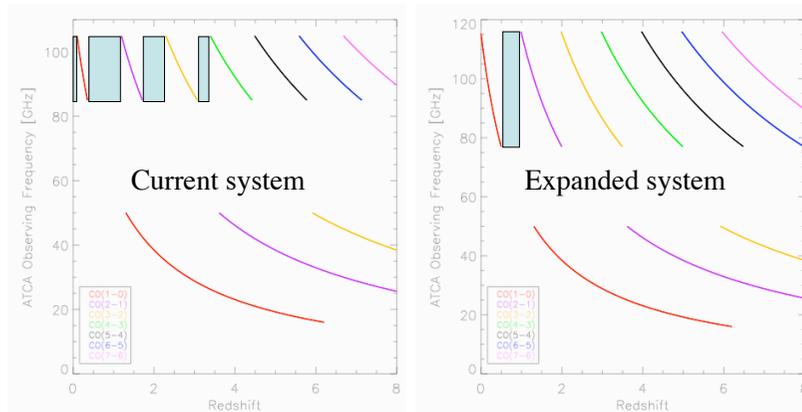
- CO is at least **8x** brighter than any other thermal molecular line in almost all celestial sources.
- CO traces gas at lower densities that simply wouldn't emit in other molecular lines.
- Nobody builds a 3mm spectroscopic instrument that can't observe CO.
- We originally thought a single MMIC receiver couldn't cover 85-115 GHz.
- The Mopra receiver now covers **77-117 GHz**.



## Science case

- **Redshifted CO**: remove all existing redshift gaps except  $0.5 < z < 1$ .
- **CO in nearby galaxies**, incl. Magellanic Clouds; correlations with IR/RC/HI.
- **Protostellar disks & outflows** (CO): follow-up of Spitzer detections
- **CO isotopomers**, HDO, methanol masers: for studies of cloud physics & chemistry. Most abundances are measured relative to CO.
- Better sensitivity to **thermal dust**
- **Polarisation** (Zeeman effect in CN, magnetic field orientation from dust continuum)

## Redshifted CO



courtesy Ilana Klammer

## Pros & Cons

### Pros

- Implement lessons learned from developing current system
- Realise full potential of MNRF1997; increase scientific interest at home and overseas
- Possibility of doing real survey science (disks, ULIRGs)
- Increased complementarity with Chilean sub-mm telescopes, which will observe higher CO transitions

### Cons

- Resource conflict with 7mm upgrade; can't start until 2007
- Limitations of Narrabri site (atmosphere)
- Limitations of antennas (efficiency, pointing)
- ALMA (early science 2008?)

## Resources

- Rough estimate: 5.7 person-years, \$545k
- Technical problems already solved on Mopra.
- Machining components seems to be limiting factor timewise: about 1 yr.
- MMIC LNA's already in hand.
- Additional time needed for installation, in order to minimise disruption to 7mm & 12mm observing.
- Could start in mid-2007 and finish in late 2008.

## Request for ATUC

- Need firm backing from ATUC that this is highly desirable
  - Not trying to derail 7mm project
  - Shouldn't clash with broadband L/S upgrade
  - 7mm system is \$6M; this is \$0.5M
- Advice on funding sources: ARC or international partners?
- Advice on how closely this should be tied to ALMA progress - would there still be demand for this post-ALMA?