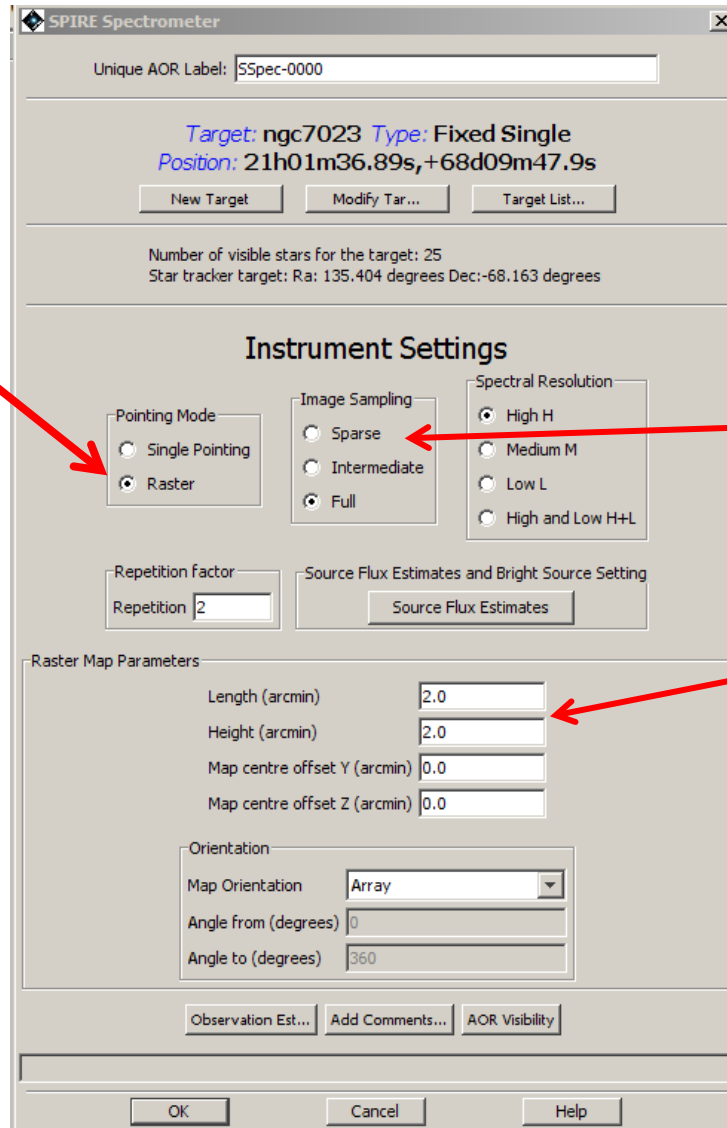


# **SPIRE Spectrometer Fully Sampled Mapping**

**Ed Polehampton**  
**RAL/University of Lethbridge**

# Fully sampled mapping

Large area mapping using Raster



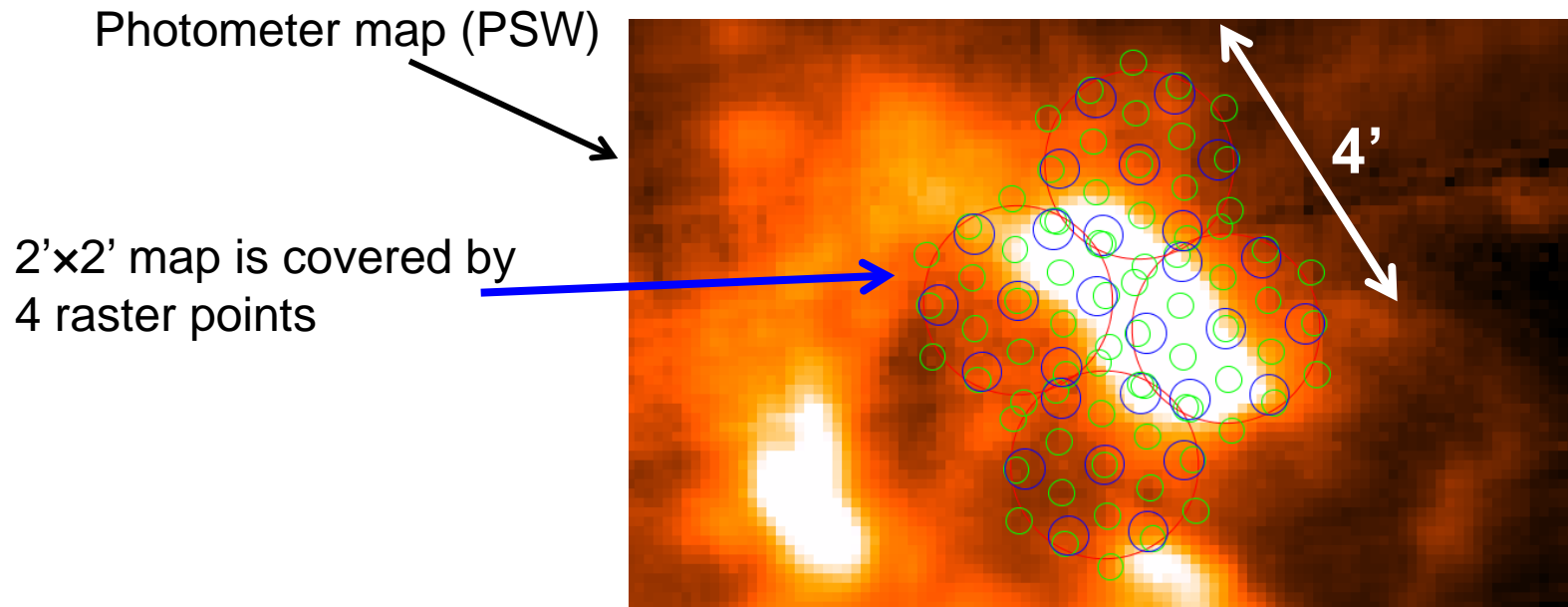
Sparse, intermediate or fully sampled FOV

Map size in arcmin

Raster pattern fixed with respect to telescope Y-Z axes – so if no constraint set, orientation may rotate on sky with time

# Planning the observation

Planning in HSpot allows the individual fields in the raster to be visualised  
(for sparse sampling, individual detectors are shown)



*Example observations:*

- NGC7023
- 2 repetitions
- High resolution
- **Sparse sampling**
- Raster (2x2 points)

*Time taken = 1609 s = 0.45 hr*

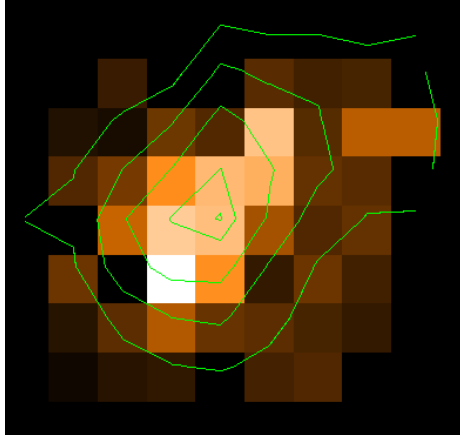
- NGC7023
- 2 repetitions
- High resolution
- **Intermediate sampling**
- Raster (2x2 points)

*Time taken = 5114 s = 1.42 hr*

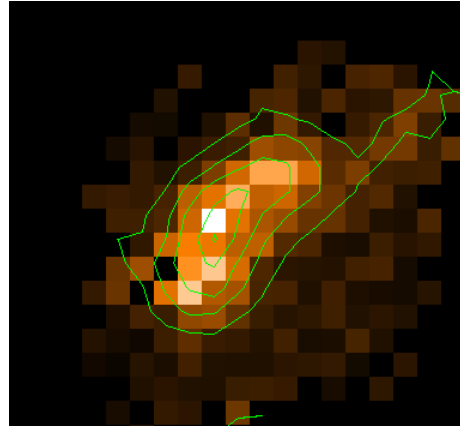
- NGC7023
- 2 repetitions
- High resolution
- **Full sampling**
- Raster (2x2 points)

*Time taken = 19130 s = 5.31 hr*

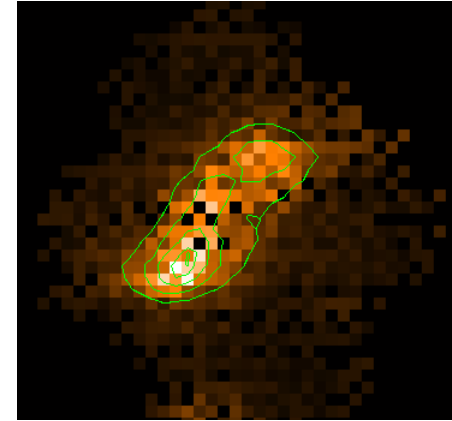
# Gridded Sparse, Intermediate and Full Maps



**Sparse** (38'' pixels)



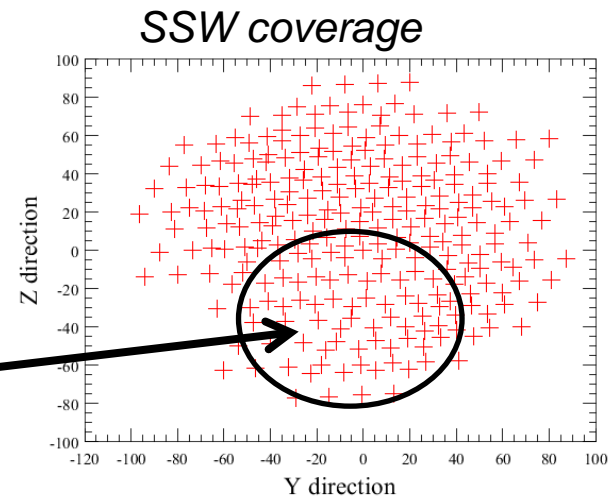
**Intermediate** (19'' pixels)



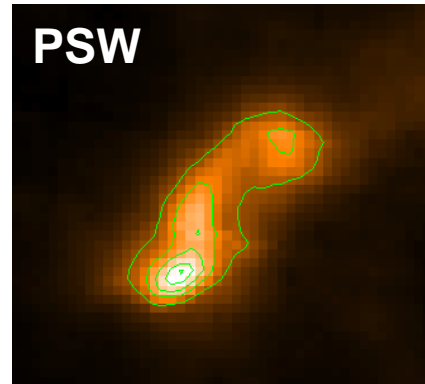
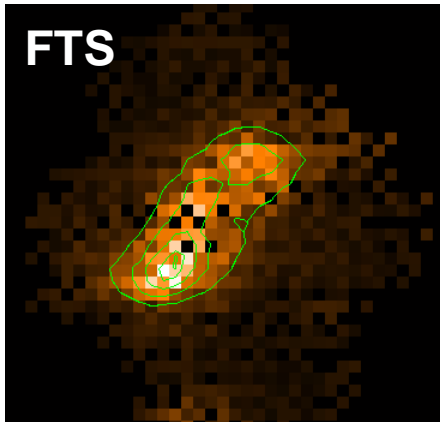
**Full** (9.5'' pixels)

- This shows the  $40 \text{ cm}^{-1}$  slice ( $250 \mu\text{m}$ ) (continuum)
- Holes in map due to naive gridding
- Contours of slightly smoothed images

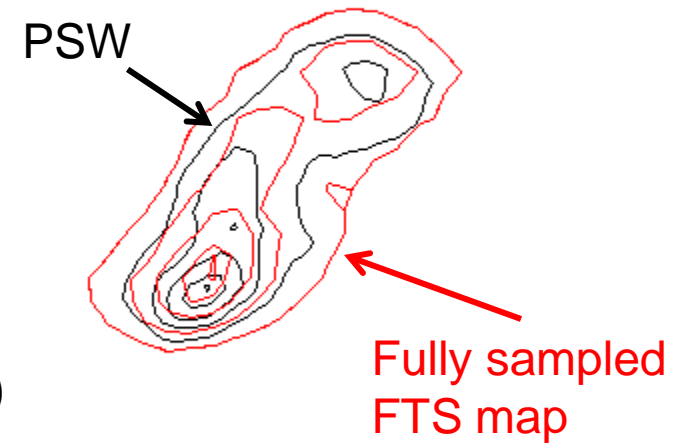
Coverage thinner due to  
dead detectors



# Comparison with Photometer

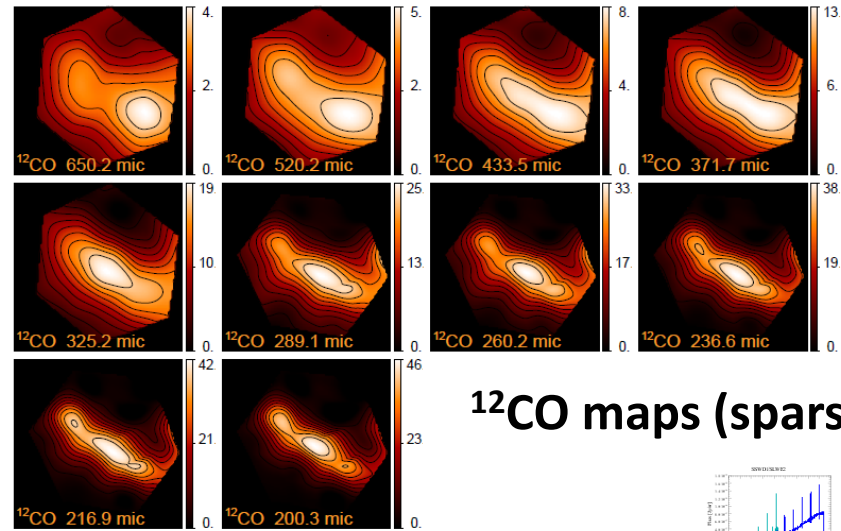
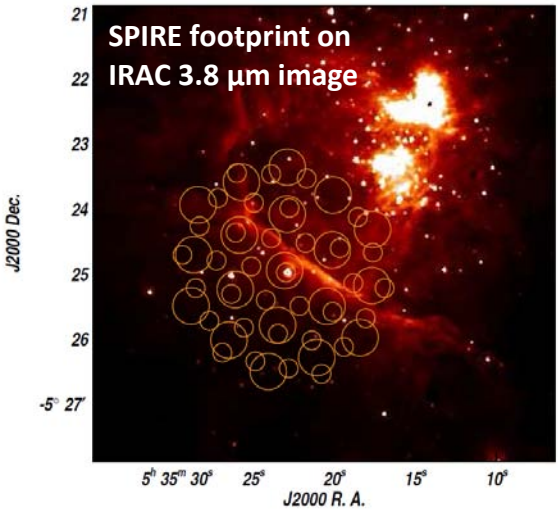


*Photometer PSW (6" pixels)*

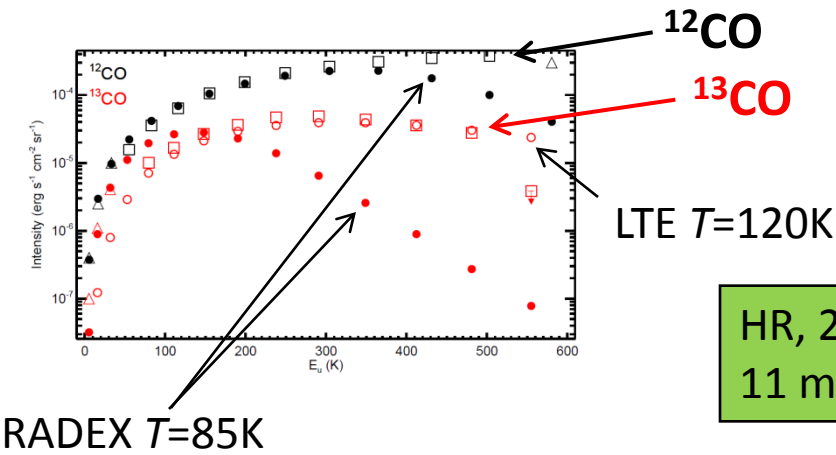
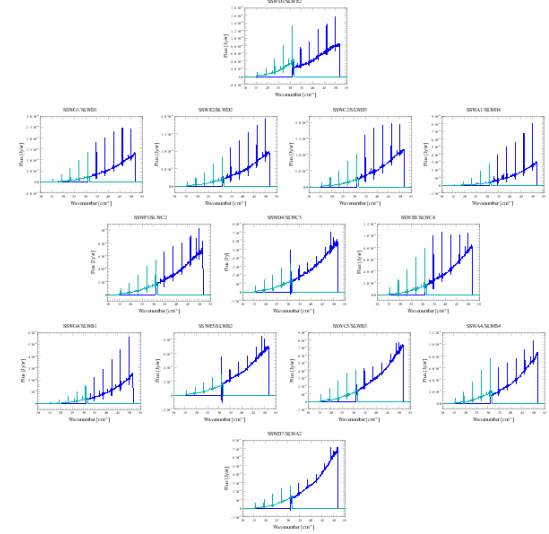


... but the advantage of the spectrometer is to make line maps..

# Orion Bar CO line maps



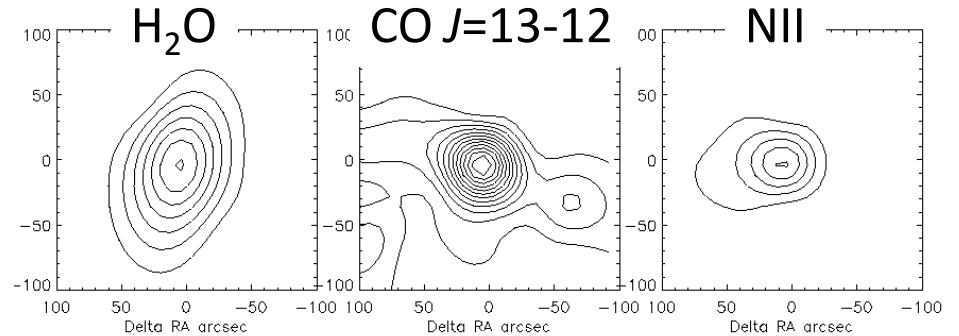
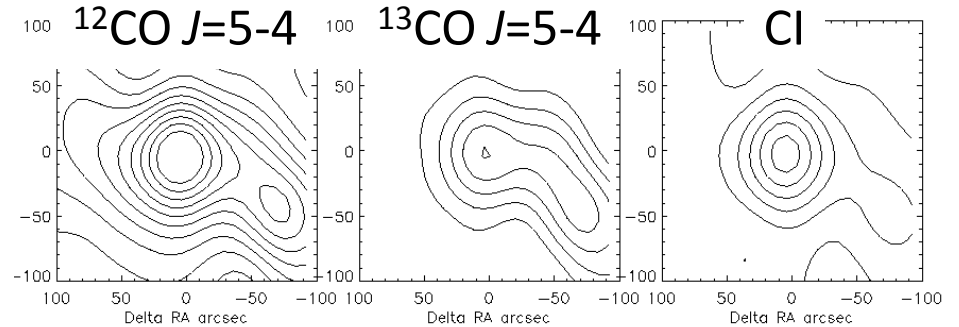
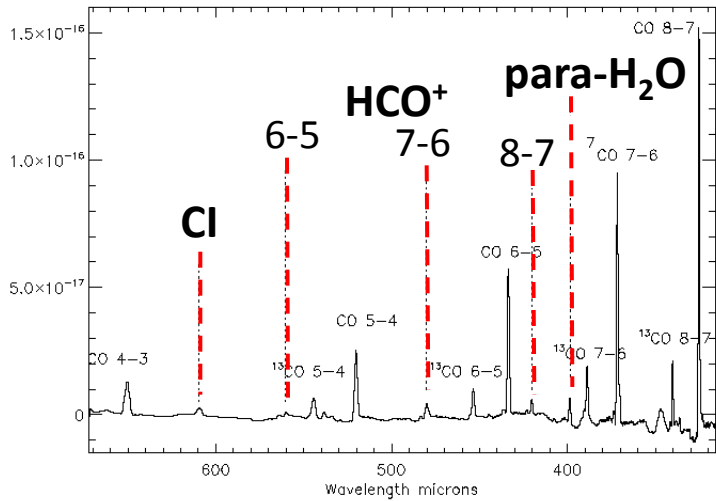
$^{12}\text{CO}$  maps (sparse)



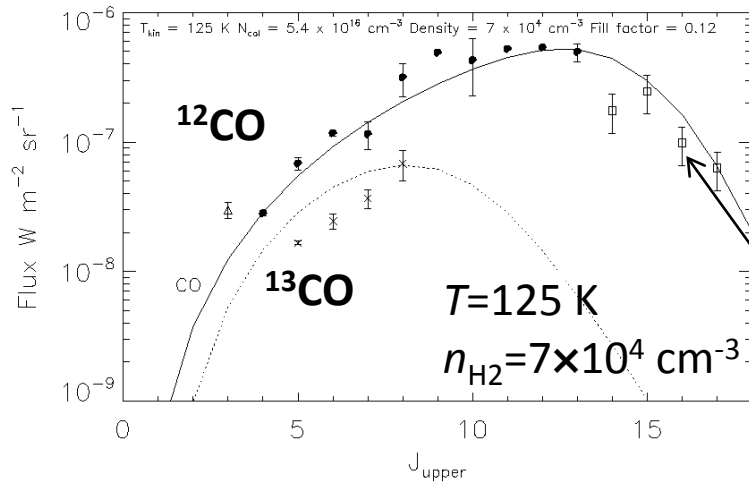
HR, 2 reps, sparse  
11 min (4 min on-source)

*SPIRE spectroscopy of the prototypical Orion Bar Photodissociation Region, Habart et al. 2010*

# DR21 line mapping



## RADEX LVG model:



ISO lines

*Sparse maps*

HR, 8 reps, sparse  
25 min (18 min on-source)

*Herschel-SPIRE spectroscopy of the DR21 Molecular Cloud core, White et al. 2010*