

HIFI spectral maps

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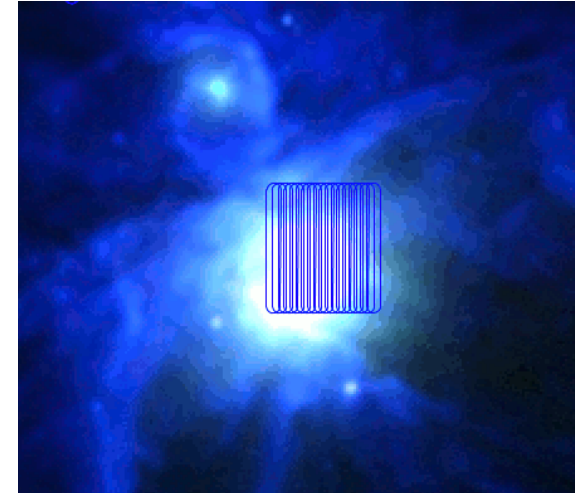
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Thanks – Frank Helmich, HIFI PI, and the HIFI Consortium

- HiFi spectral mapping modes
- Pointing effects and other calibration issues
- Why do your own re-processing?
- Working with HiFi maps in HIPE (demo)

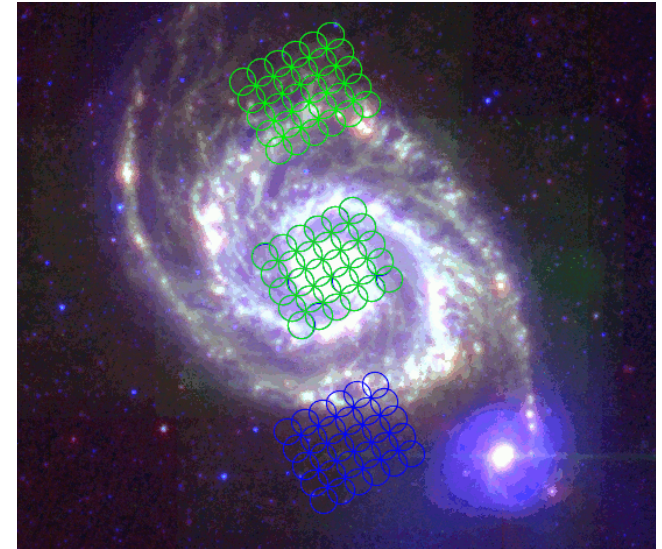
- Two types of HiFi maps

- On The Fly ('OTF')



- Most commonly used mapping mode
- Data read continuously (every 4 sec)
- Position switch is most commonly used for reference
- Frequency Switch and Load Chop (with or without sky reference) also available

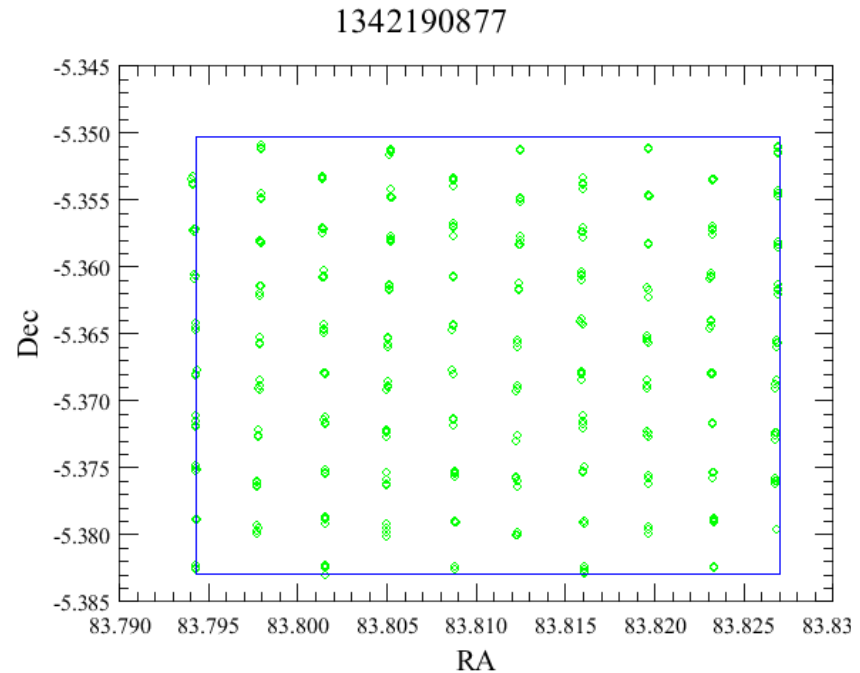
– Raster (Dual Beam Switch)



- Data read at specific points on sky, determined by beam size and requested spacing (Nyquist, half-beam, 40", 20", 10")
- Fast and slow chop available
- Can be performed with or without optimisation for continuum stability

- Pointing

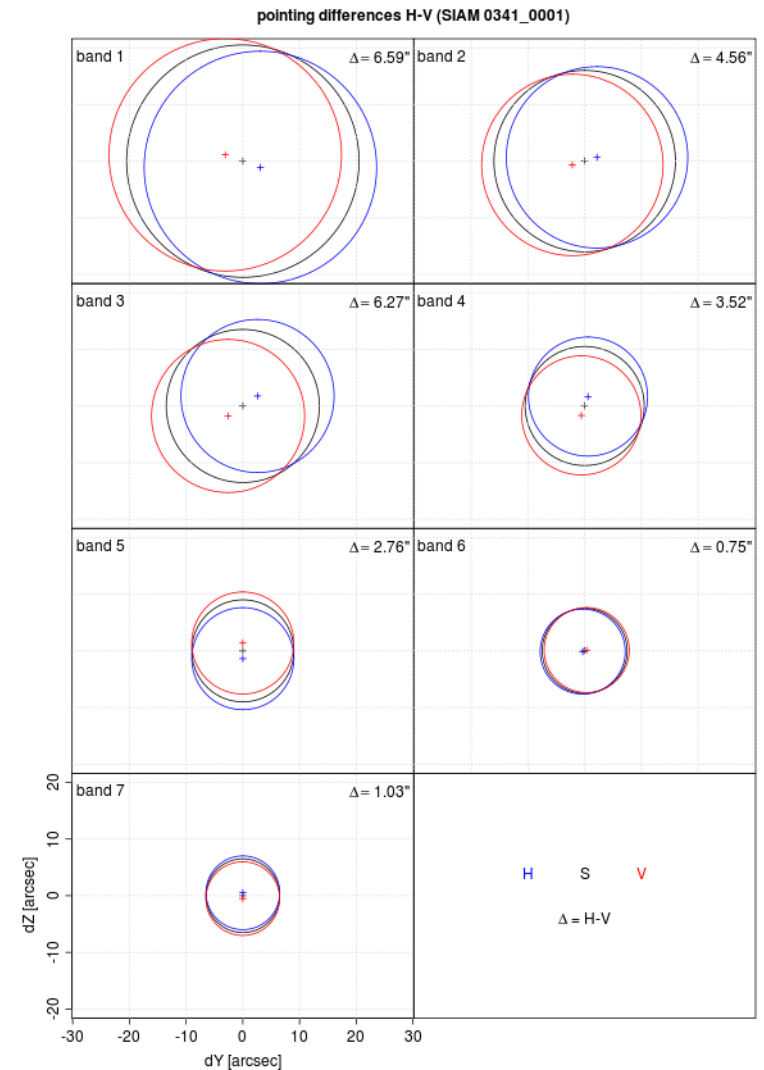
- Zig-zags



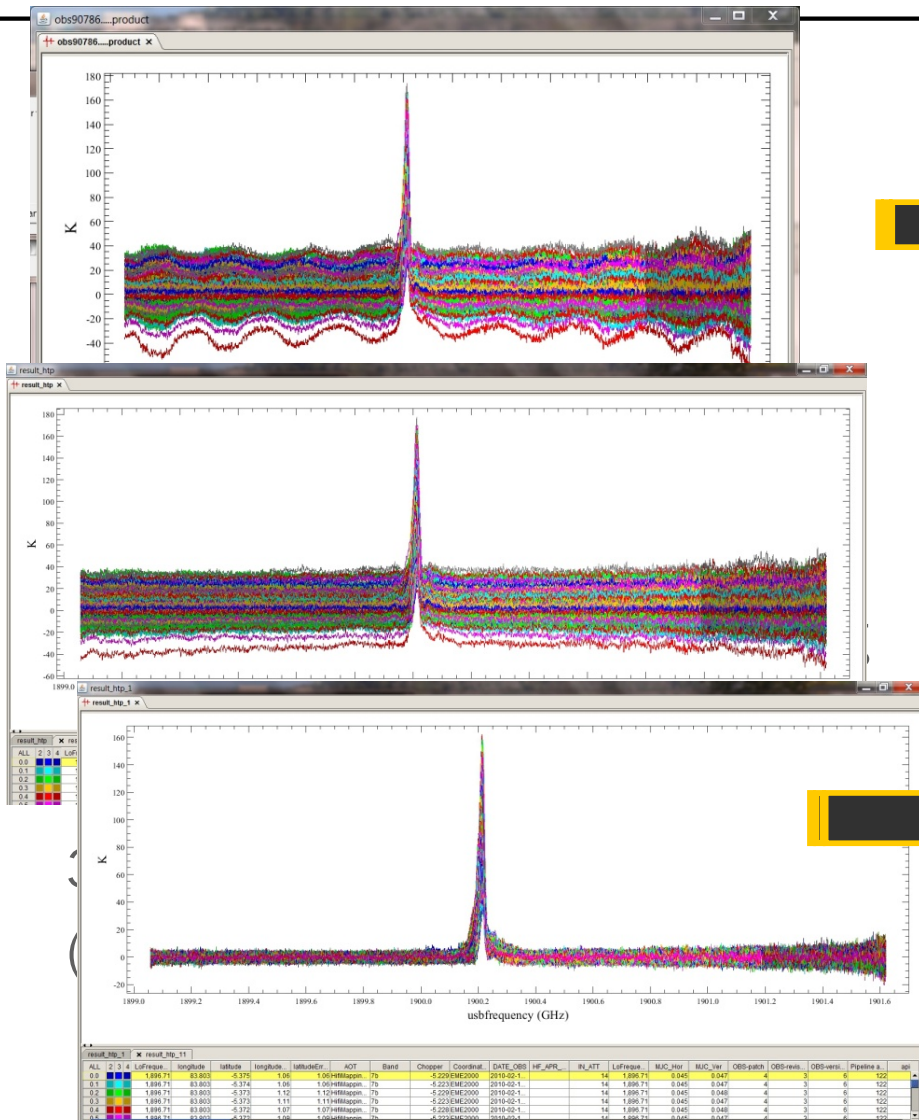
- Timing mis-match between the satellite and HiFi means OTF maps are performed in a zig-zag pattern
- OTF maps are extended by one repeat to ensure requested sensitivity is achieved over area requested

- H and V beam offset

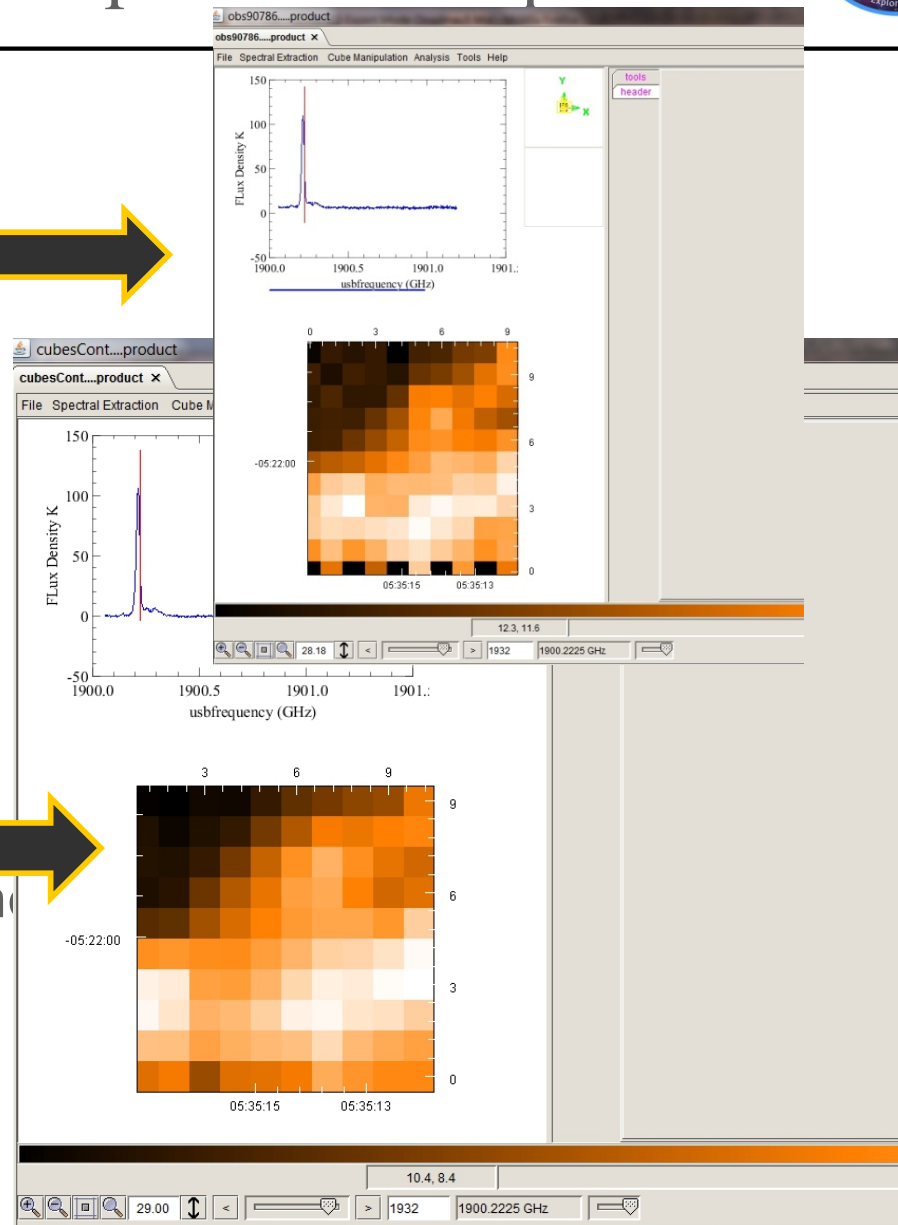
- H and V beams are not aligned
- Different H and V line profiles can be a consequence of structure in target, or a real polarisation effect
- User to decide if H and V data should be averaged to achieve requested *rms* or not



- Baseline issues
 - Standing waves
 - Baseline drift
 - Both should be corrected prior to gridding
 - Data taken without a sky reference can have very strong standing waves



Smoothed baselines removed



Cube regridded from cleaned HTP

- Pipeline (levels 0-2):
 - If data has been processed with a HIPE version prior to 9.0 then then map gridding may not be optimal in all cases
 - Possibility to correct for contamination in DBS chop positions or omit contaminated chop position
 - Convert to T_{mb}
- Data Cleaning:
 - Correct baseline issues prior to re-gridding
 - Can be done in interactive pipeline between levels 2 and 2.5 or using stand-alone tools

- Re-gridding (level 2.5 pipeline):
 - Correct for position angle of map
 - Change sampling/convolution to compare with other maps (different frequency/beam size)
 - Redefine pixel size according to S/N
- Map combination:
 - H and V polarisation in same observation (prior to re-gridding)
 - Maps from different observations at same (or similar) frequencies