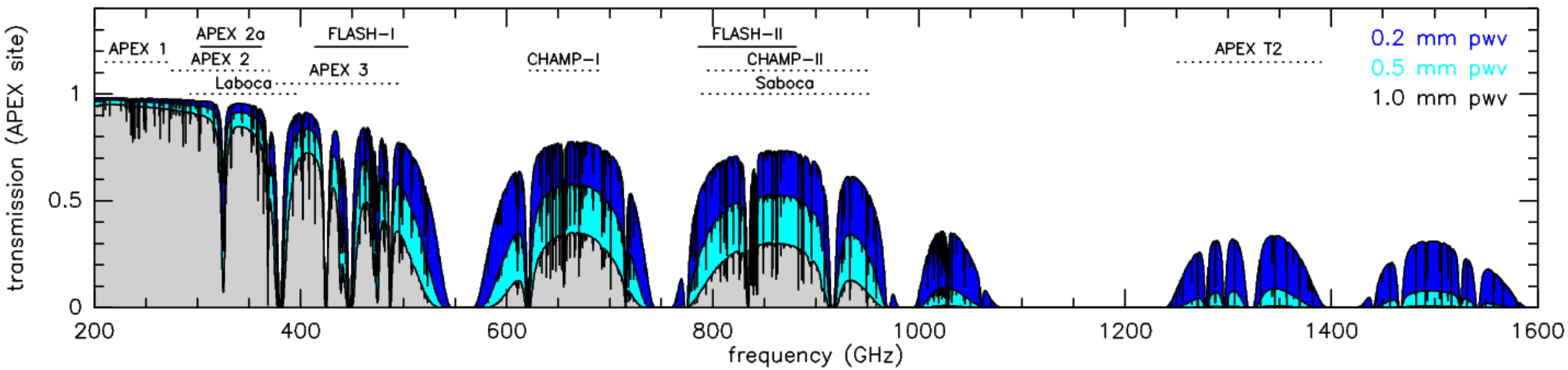
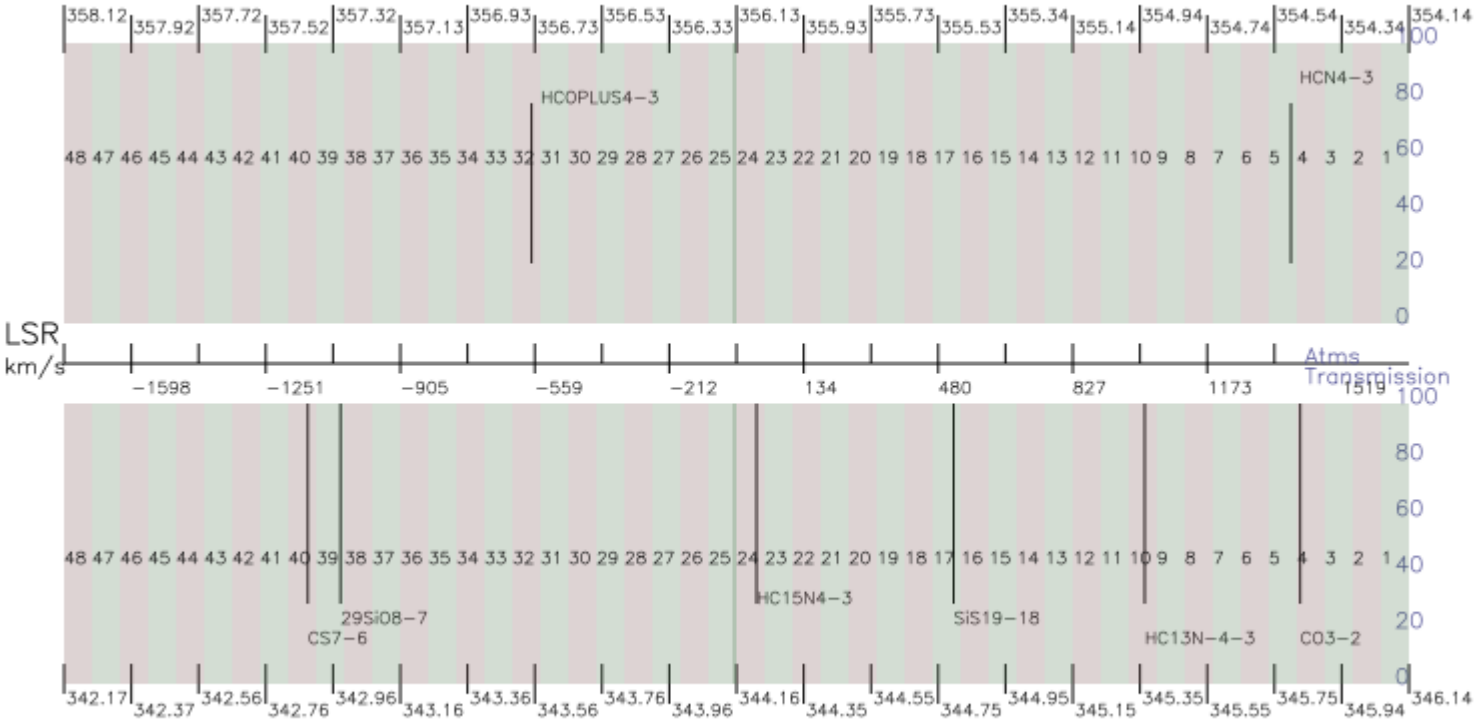
APEX heterodyne observations

- Rough guide for required weather:
  - APEX-1: PWV > 2mm (could be up to 5mm)
  - APEX-2/FLASH345: PWV < 2mm (but e.g. lower end ~270-310 also at worse, higher end ~370 at better conditions)
  - FLASH460: CO4-3 1mm ok, CI needs almost 0.5mm conditions
  - CHAMP: start at about 0.5mm



FEBE setup:
http://sma1.sma.hawaii.edu/pb2/passband.html



332.25 Lower 13co 12co h13cn hc15n
344.2 Lower cs hc15n h13cn co hco+ hcn
346.0 Lower hc15n h13cn co h13co+ sio hco+
362.0 Lower hnc n2h+

Rough sequence of observations

- Pointing/Focus/Pointing on Planet
  - Check flux, e.g. with values expected from astro and typical efficiencies
- Pointing on nearby pointing sources
  - Either CO line pointing or on dust continuum
- Use calibration/test source (each day)
  - e.g. see calibration plan on website
- Do all observations calibrated
- Calibrate every 10 minutes, but adjust to weather conditions
- Pointing every hour (but daytime, high elev...)

Pointing & Focus

- In tp mode for strong sources (e.g. Jupiter)
- wob(rate=1) for weaker sources, even hot cores with a few K continuum are possible
- On stars as line pointings in CO line

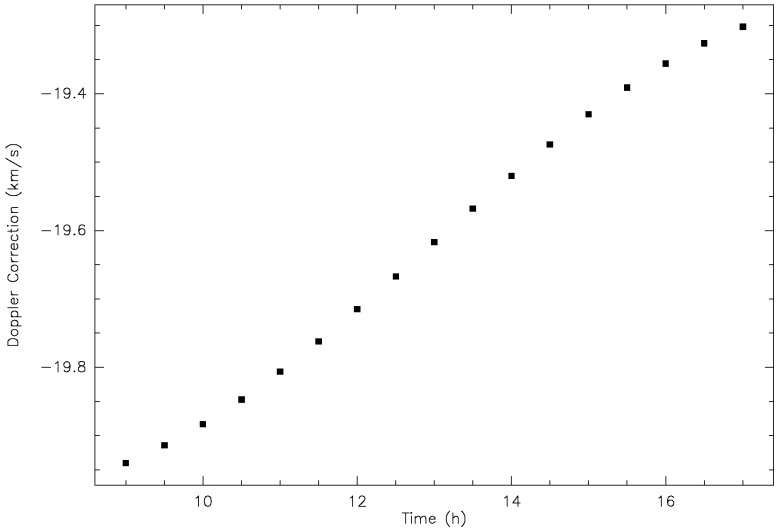
- Adjust focus after sunset and sunrise
- At high frequency, adjust focus more often, focus at similar elevation

Staring observations

- For wobbler avoid dewar cycle rate (1Hz):
  - e.g. wob(rate=1.5) or wob(rate=0.7)
- In tp mode use on/off cycles shorter than stability time of receiver
- For longer integrations, use repeat to reduce deadtimes (instrument setup times)

On The Fly Mapping

- Basket weaving
- CHAMP: observe redundant, all pixels should see whole map → averages out pixel differences
- Think about stability time → ref selection
- Reference emission free? Otherwise still possible to add measured reference emission
- Don't forget calibrations
- Don't do one hour OTFs ! Note, doppler tracking only done at beginning of scan

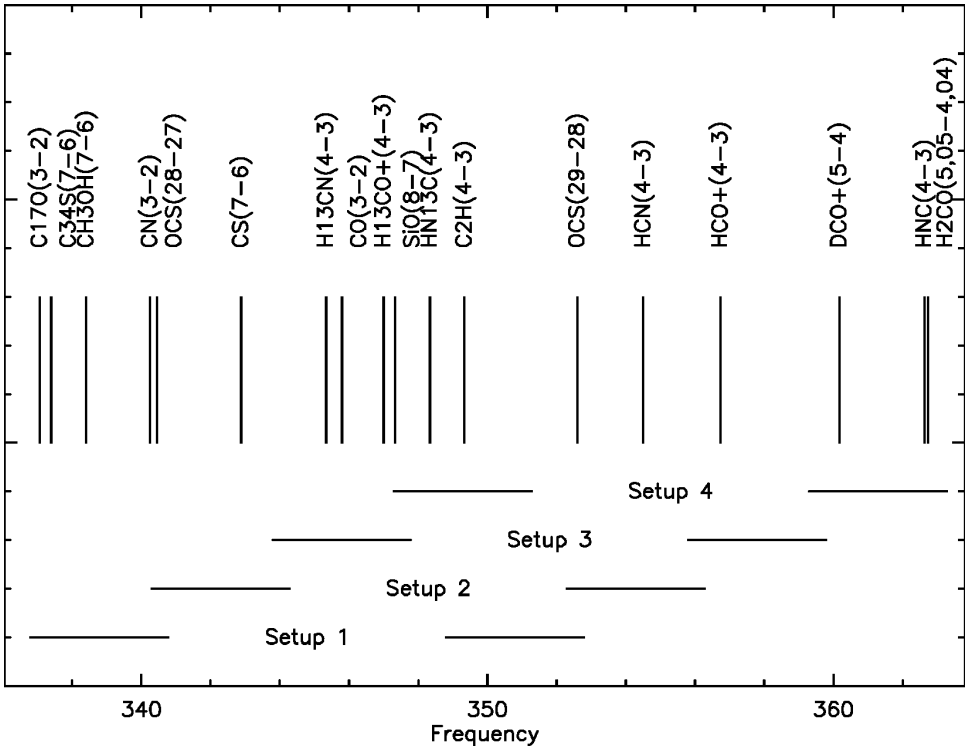


Reference positions

- Take care in selecting off positions, e.g.
  - Check allsky/galactic plane CO or IR surveys
  - Trade off between too far (bad baselines/calibration) and too close (not emission free)
  - Give preference to positions at comparable elevations
- In case of doubts give test offs further out, use two reference positions

Line surveys

- FLASH+: line survey machine
- Build in overlap, be careful with detections at edges (~50MHz)
- 2x30GHz only 4 settings!



During observations

- Sum up incoming data:
  - Baselines ok?
  - Reference ok?
  - Intensities/line widths as expected?
- From Raster/OTFs build maps:
  - Coverage ok?
  - Noise homogeneous?
  - Again baselines/reference

Thanks for your attention!
Questions?