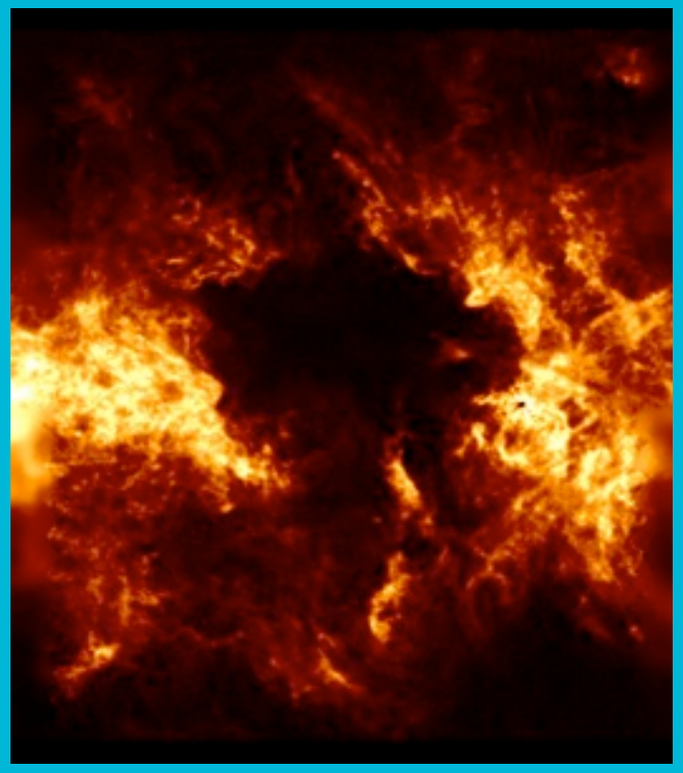


Parkes and the diffuse interstellar medium

Alex S Hill

CSIRO ASTRONOMY & SPACE SCIENCE
www.csiro.au

Scientific questions

How does feedback from stars affect the ISM on galactic scales?

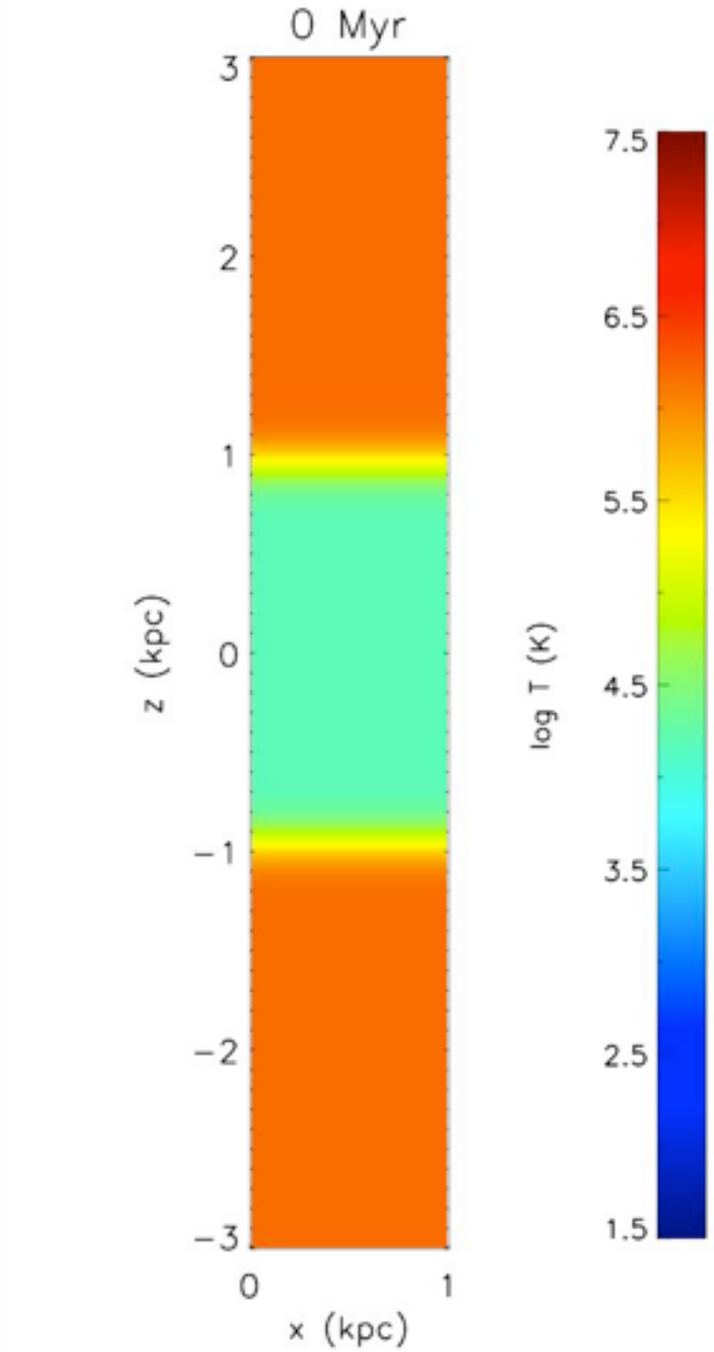
- Mechanical
- Ionisation
- Magnetic fields?

How do the Galactic disk and halo interact?

- Which high and intermediate velocity clouds are infall? Which are part of a Galactic fountain?
- How much mass accretion is there and how does it work?
- Magnetic fields?

How do cold clouds form?

- Which physical processes control the transition from diffuse gas into star-forming gas?

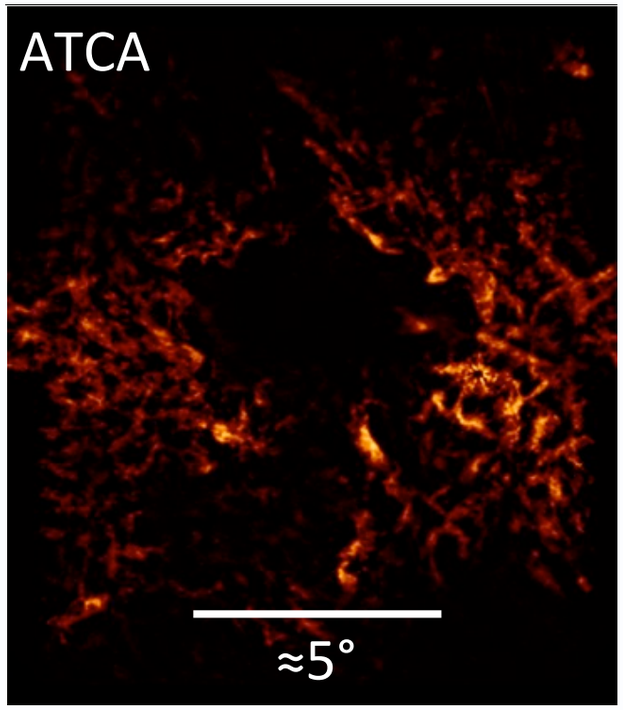


Hill et al (2012)

Past and ongoing Parkes work

Stellar feedback

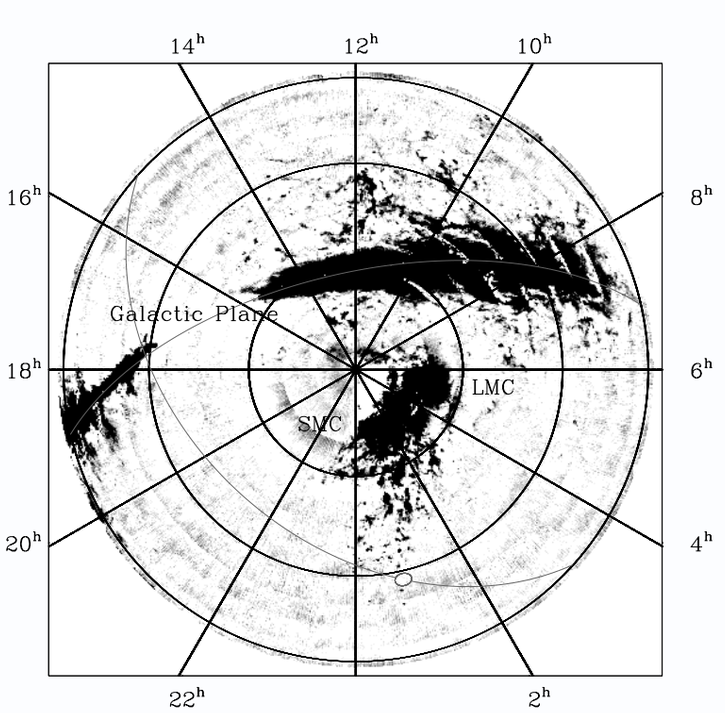
- H I shells trace large-scale feedback
  - Southern Galactic Plane Survey (SGPS); GASKAP
  - Need total power to complement Compact Array and ASKAP



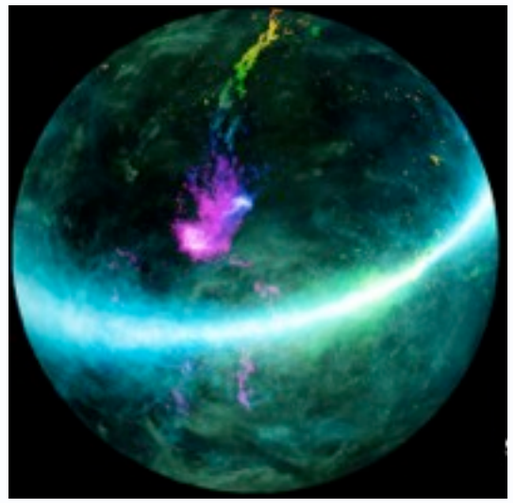
SGPS (McClure-Griffiths et al 2003)

Disk-halo interaction

- From all-sky surveys
  - HI Parkes All Sky Survey (HIPASS; Putman et al 2002)
  - Galactic All Sky Survey (GASS; Moss et al in prep) HVC catalogs



HIPASS-HVC (Putman et al 2002)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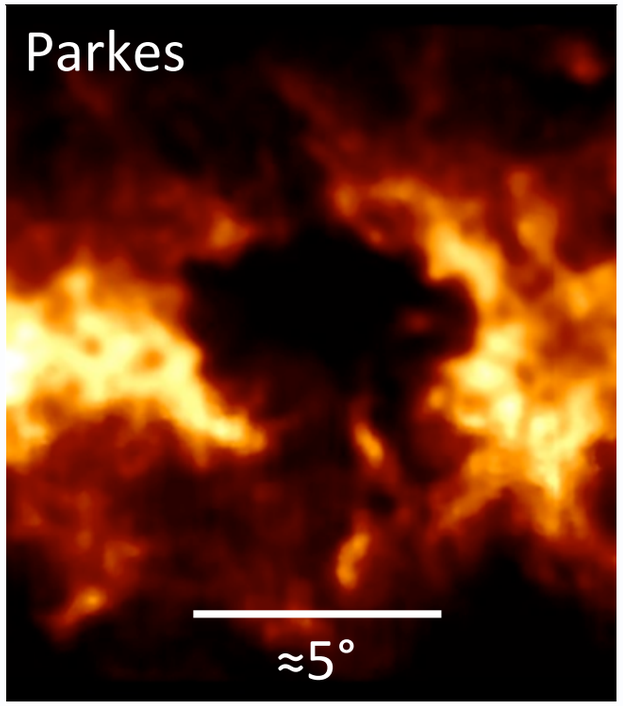

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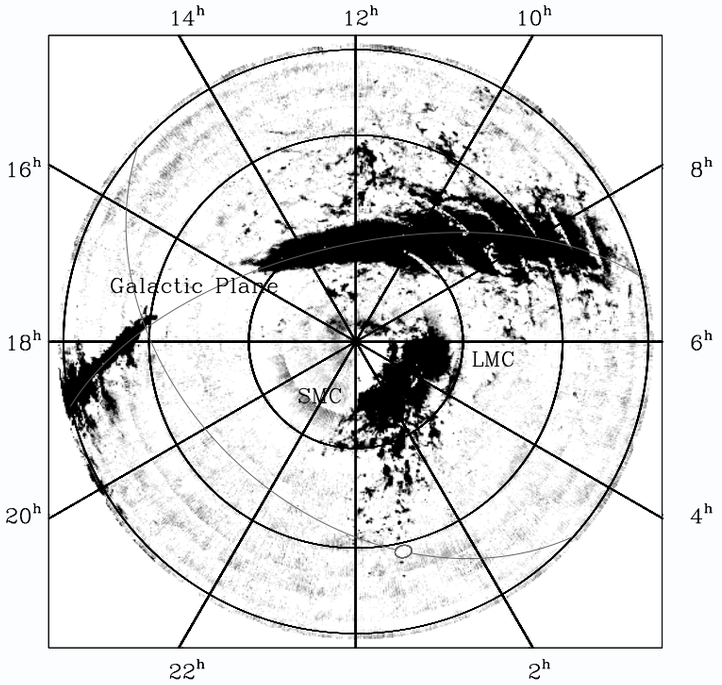

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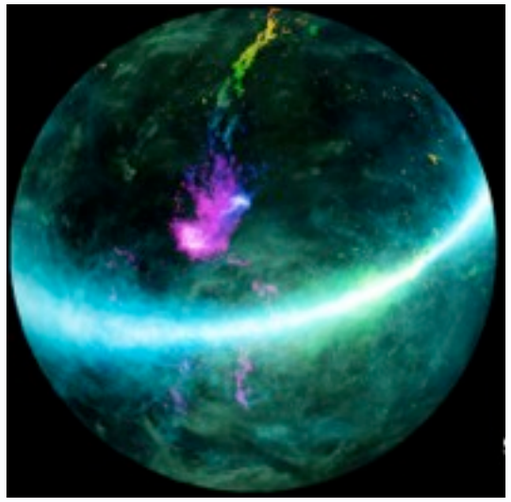
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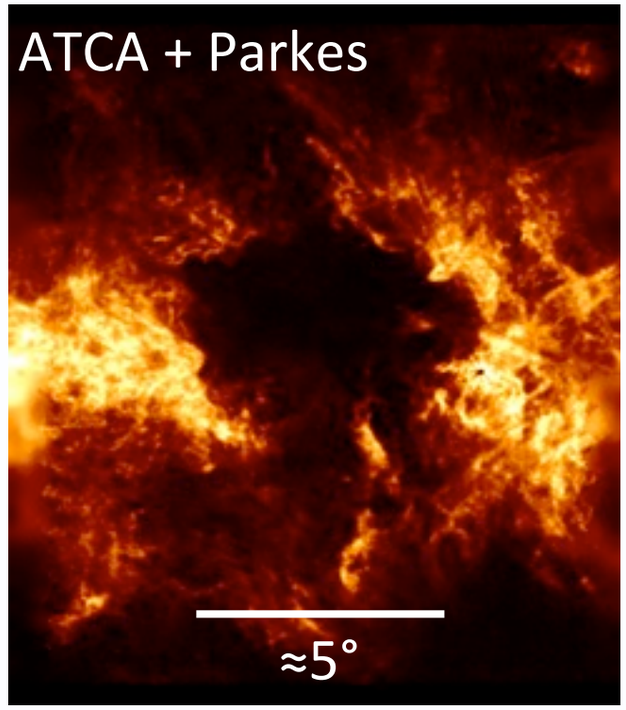

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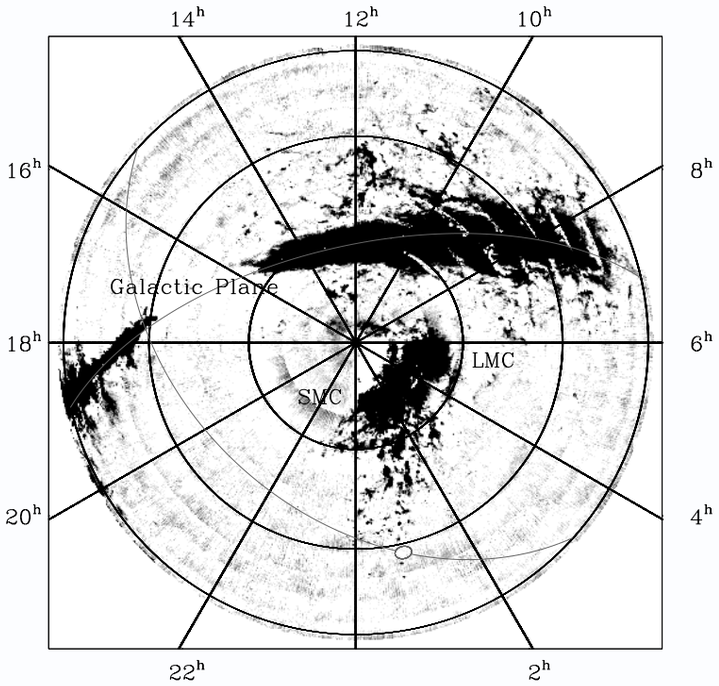

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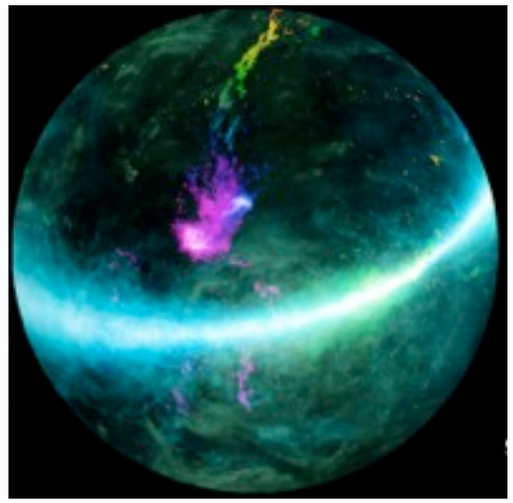

GASS (McClure-Griffiths et al 2009)

Ionised gas

Diffuse polarised emission

- GMIMS, STAPS, and S-PASS

Radio recombination lines

- Measure ionised gas emission measure independent of optical Hα
- Derive temperature

Pulsars

- DM: electron column density
- RM: electron column density and magnetic field

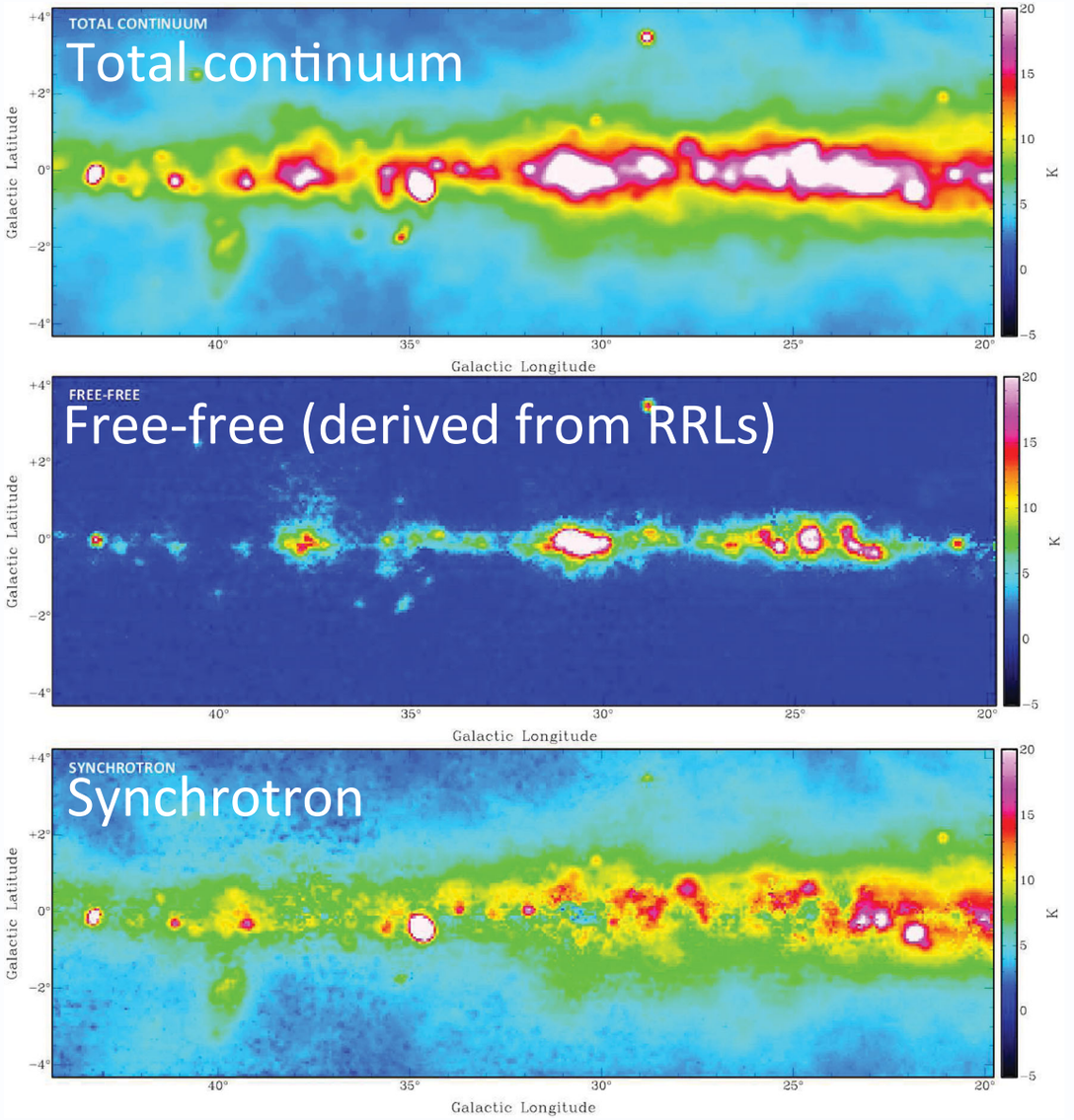


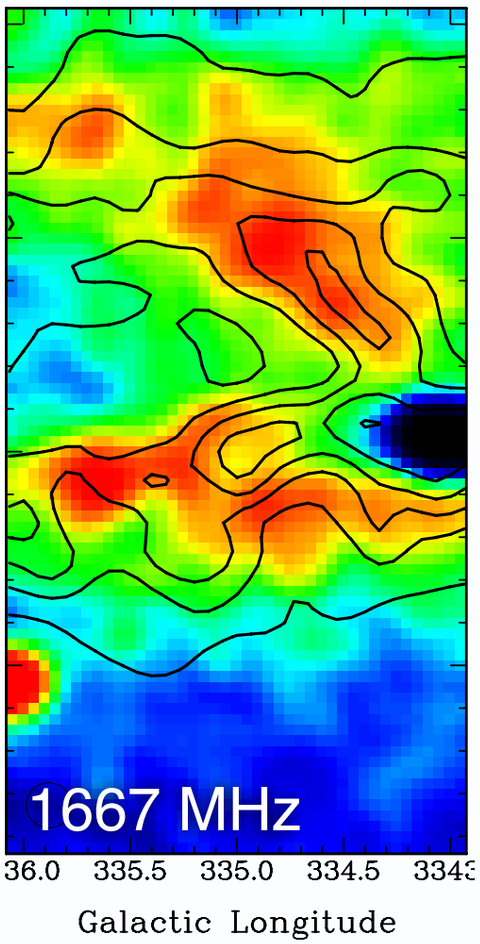
Figure 7. Maps of the total continuum, free–free and synchrotron emission at 1.4 GHz and 14.8-arcmin resolution. The free–free emission is estima
the RRL integral using the T_e–R_G relationship from equation (5). The synchrotron is the difference between the total continuum and the free–free
and shows a narrow diffuse emission confined to the plane. The colour scale is linear and in units of brightness temperature (K).

Alves et al (2012)

Atomic-molecular transition

OH traces low-density molecular gas

- does not emit in CO
- tracer of transition from atomic to molecular gas?
- typical diffuse OH: 100 mK

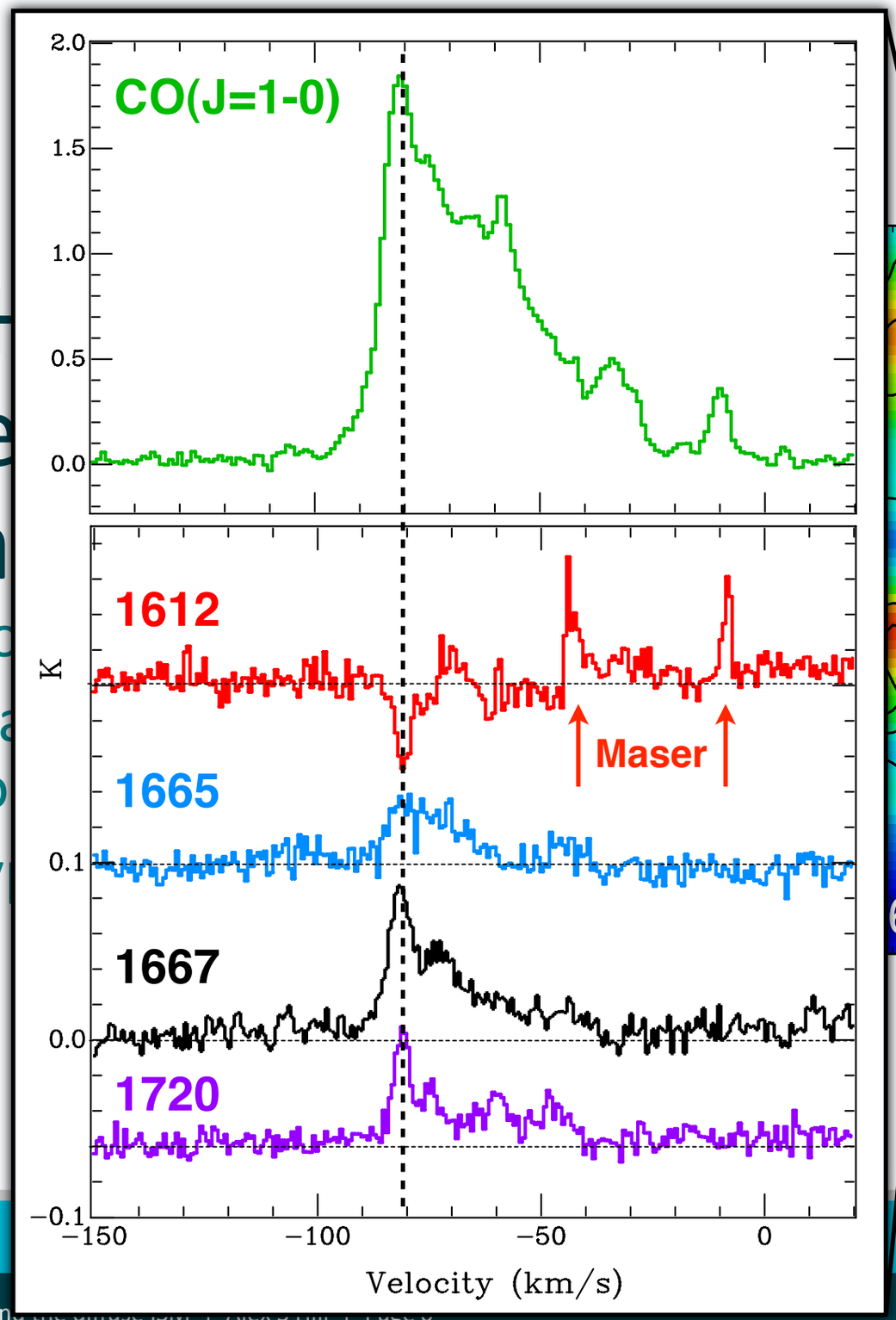


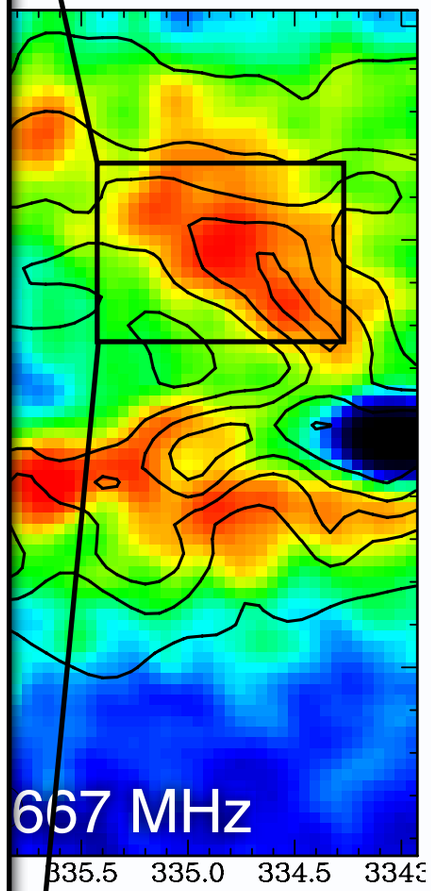
Slide courtesy Jo Dawson
SPLASH survey

Contours: Smoothed NANTEN ^{12}CO(J=1–0)

Atomic-molecular transition

OH
de
ga
- do
- tra
  to
- ty





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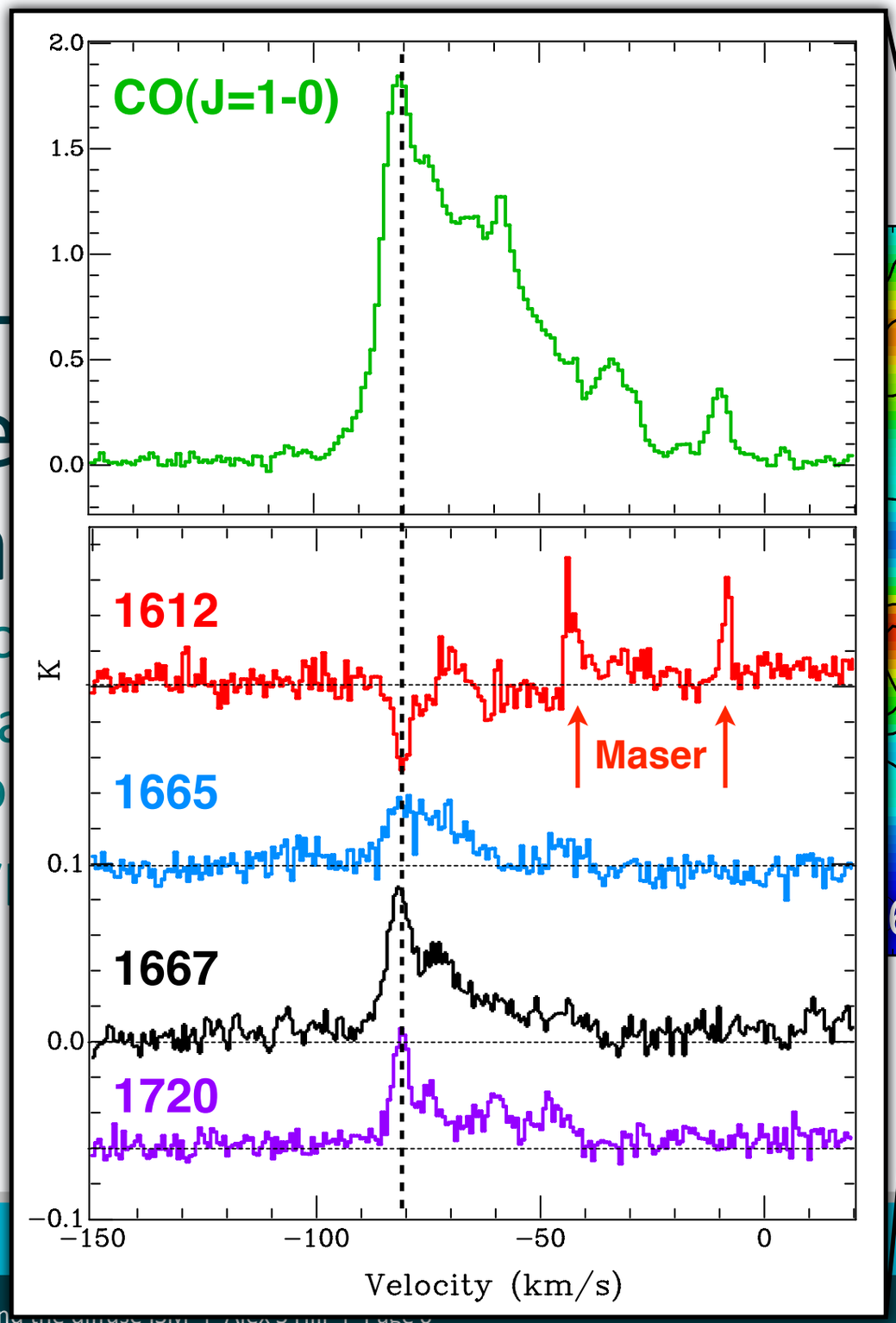
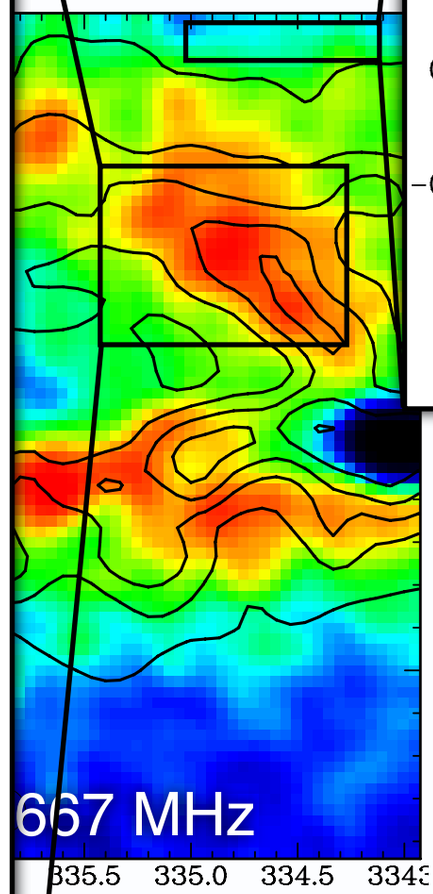
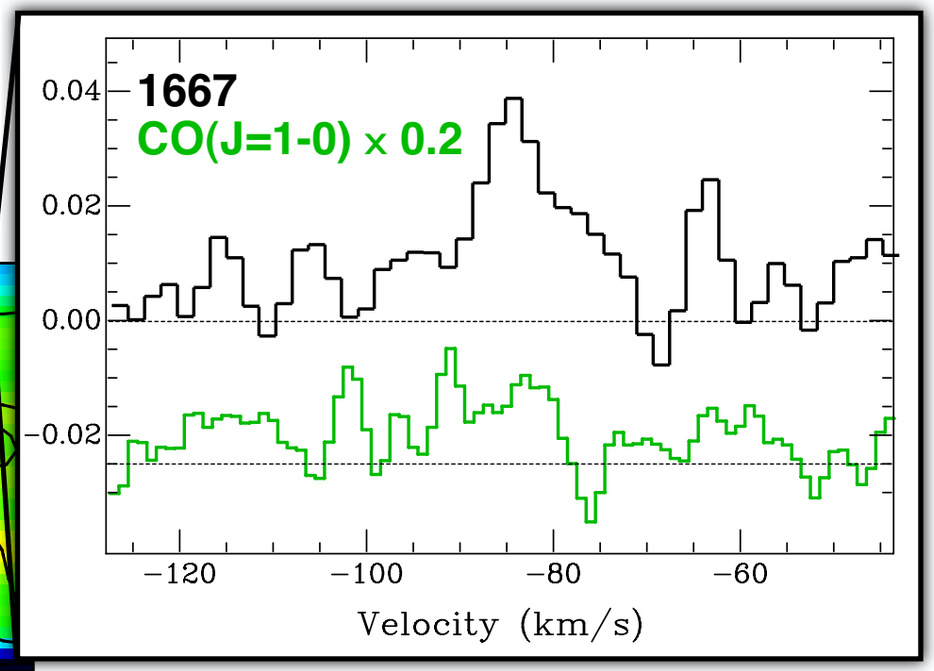






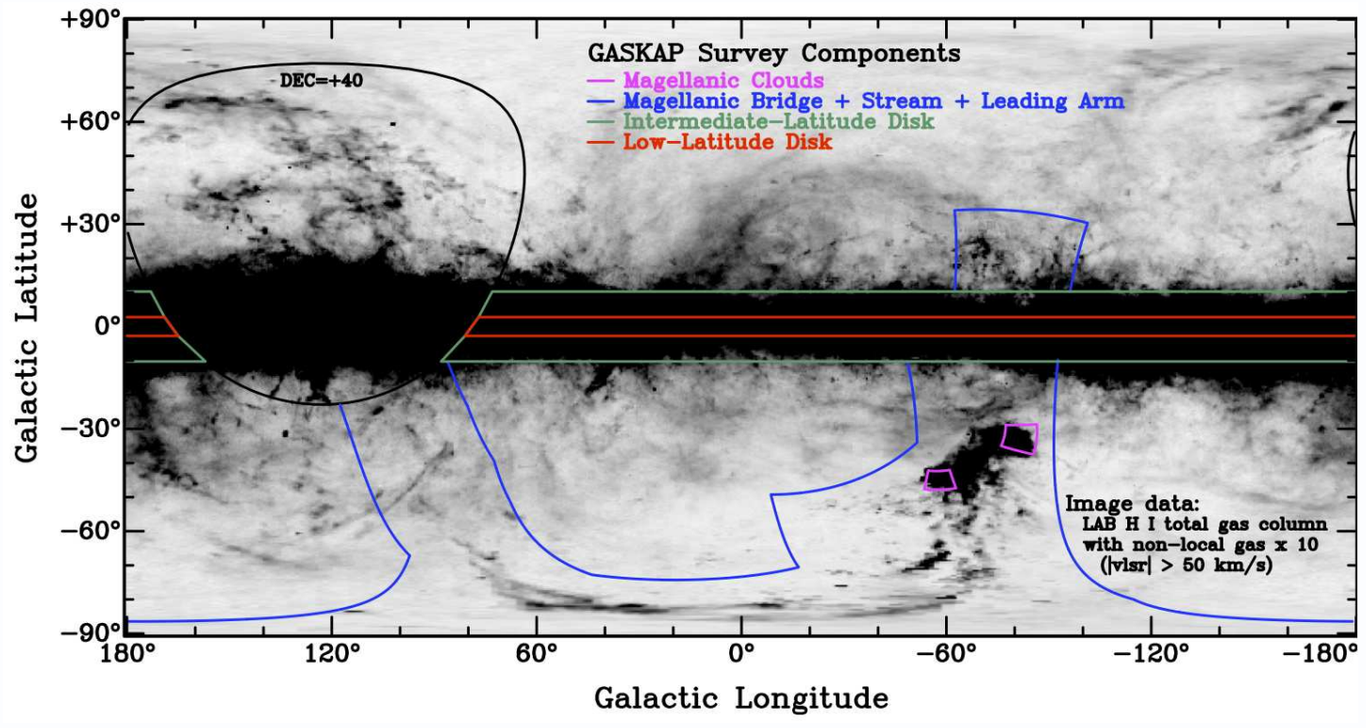
Slide courtesy Jo Dawson
SPLASH survey

Contours: Smoothed NANTEN ^{12}CO(J=1–0)

The future

Single dish complement to ASKAP

- GASKAP survey
  - H I emission and absorption
  - OH (diffuse and masers)
  - in plane and Magellanic System
    - GASS provides single dish H I
    - SPLASH provides single dish OH, but only up to |b| = 2°, limited longitude
      - 20 mK rms to detect typical diffuse OH



GASKAP H I and OH survey area
Dickey et al (2012 PASA/arXiv)

Diffuse polarised emission

- PAFs provide improved circular symmetry of polarisation beams (Braun 2012, Oosterloo et al 2010)
- Wide (RFI-free) bandwidth important

Galactic-scale structure of the ISM

- See Jimi's talk

Thank you

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