



New Horizons for Radio Astronomy

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New Horizons in Radio Astronomy

September 12, 2017:

Me: “Hi [redacted]...This week I am in Montreal at a meeting to dream up new Canadian radio projects.”

[redacted]: “How many new projects does Canadian astronomy need right now?”



Radio Astronomy Parameter Space



- Frequency Range
- Angular Resolution
- Spectral Resolution
- Sensitivity
- Polarization
- Time Domain

Frequency Range

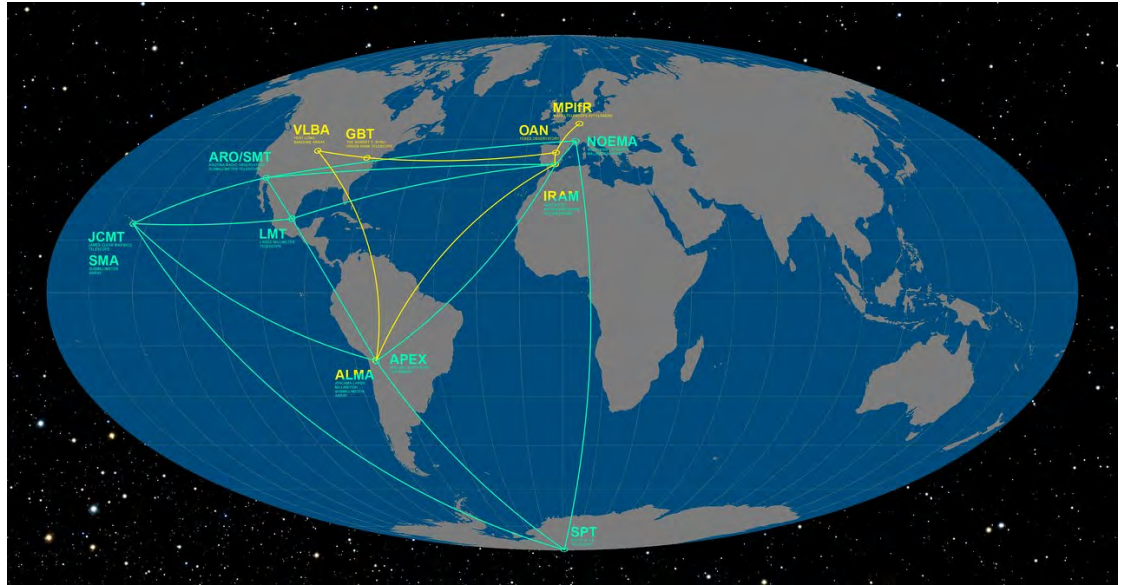


Is there Canadian interest in radio astronomy beyond the 50 MHz to 100 GHz range?

Angular Resolution



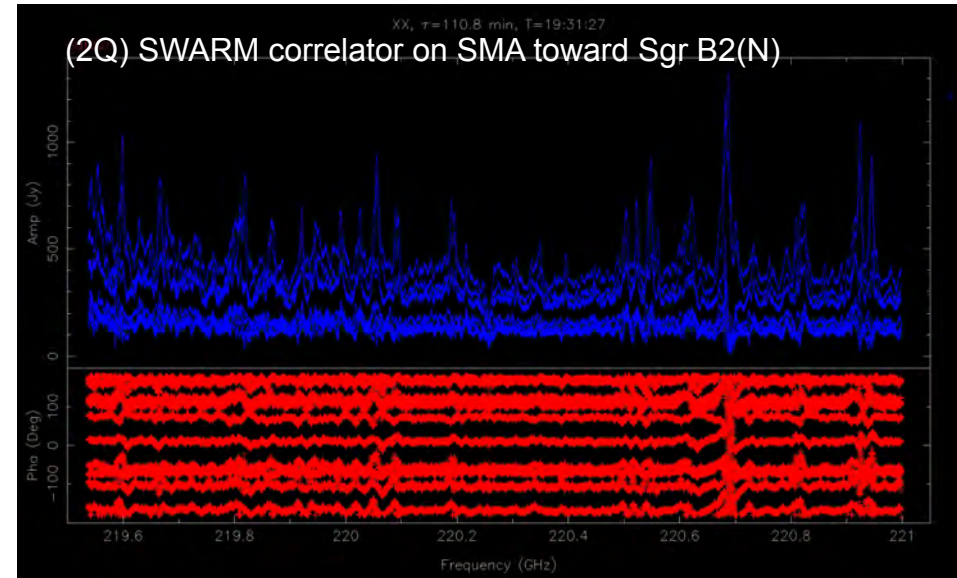
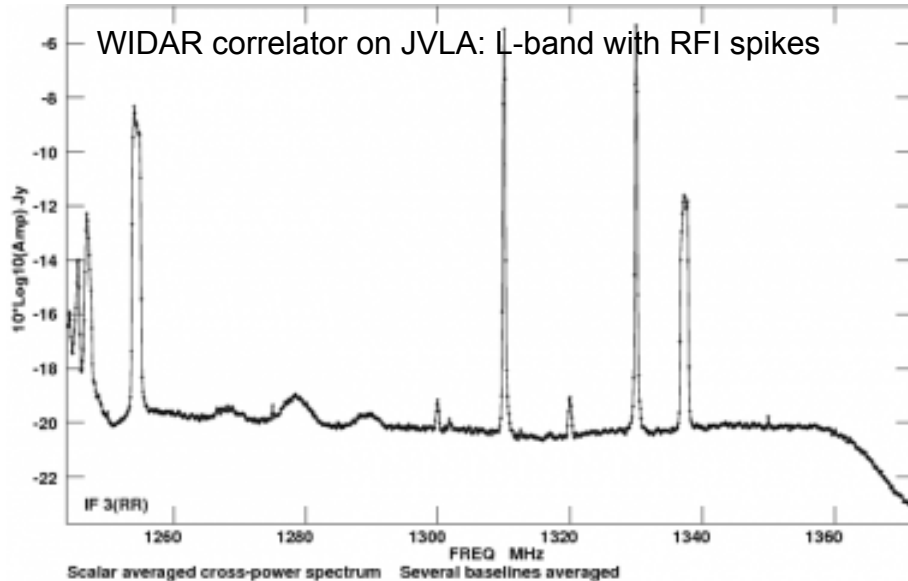
High Sensitivity Array (cm)



Event Horizon Telescope (mm)

Do Canadians want access to micro-arcsecond resolutions for their science?

Spectral Resolution & Bandwidth



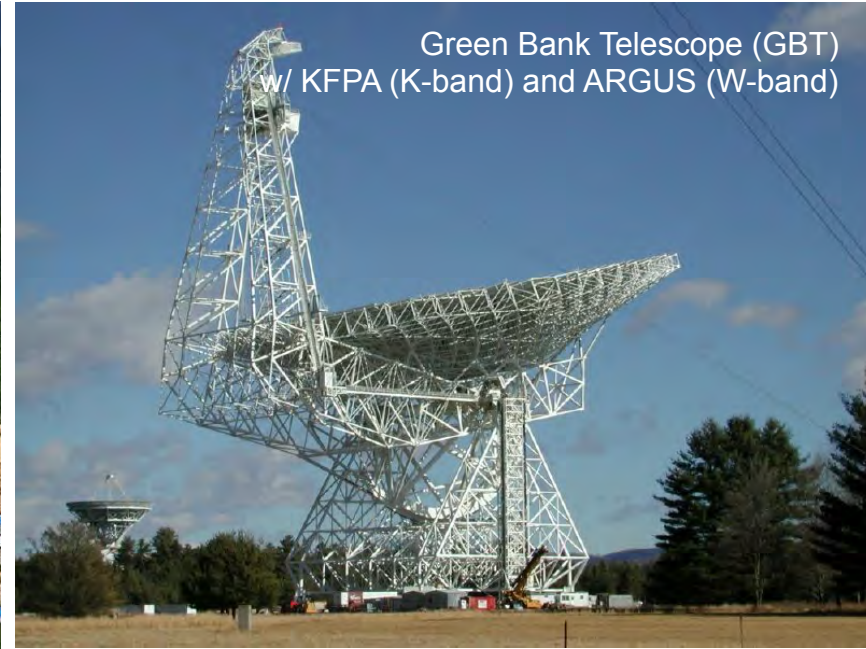
How high spectral resolution or instantaneous bandwidth do Canadians want?

Sensitivity & Mapping Speed

500 m Aperture Spherical Telescope (FAST)



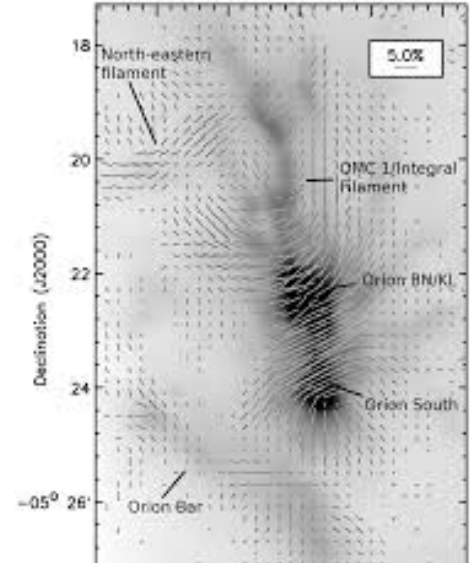
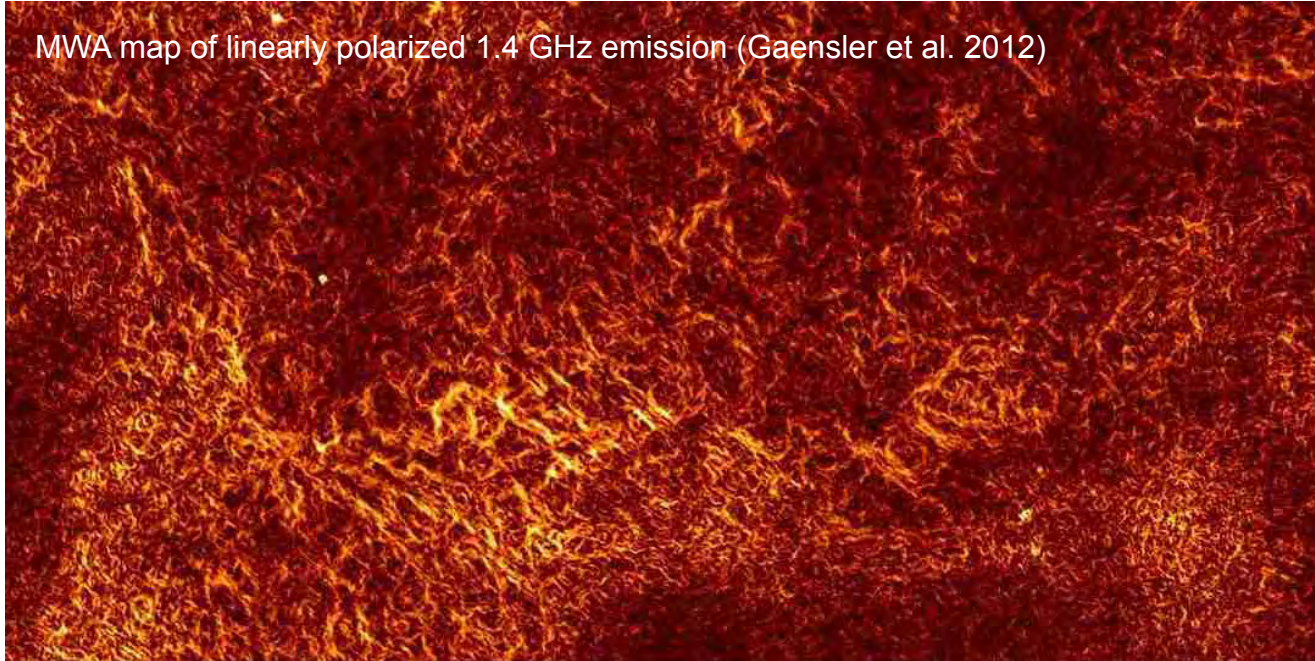
Green Bank Telescope (GBT)
w/ KFPA (K-band) and ARGUS (W-band)



What levels in sensitivity are needed? What focal plane mapping instruments?

Polarization

MWA map of linearly polarized 1.4 GHz emission (Gaensler et al. 2012)



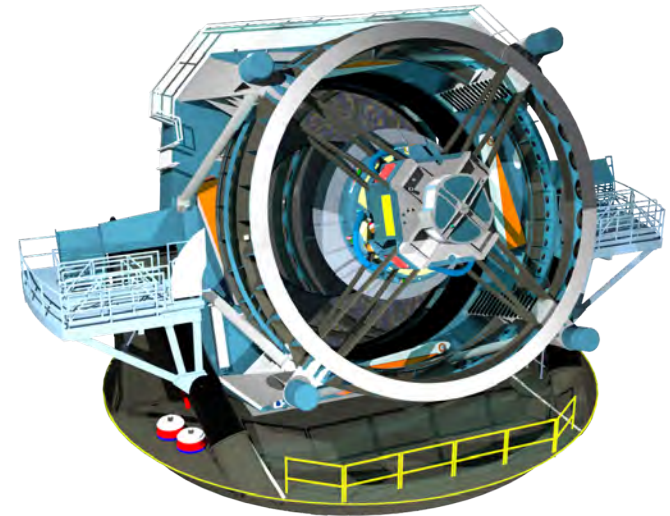
JCMT map of linearly polarized 850 um emission (Pattle et al. 2017)

How much polarization is left to study in the Universe?

Time Domain



Canadian Hydrogen Intensity Mapping Experiment (CHIME)



Large Synoptic Survey Telescope (LSST; model)

Is a radio-LSST possible? If so, is it scientifically interesting?

PROVOCATIVE STATEMENTS FOR THE END OF THE DAY

- **Radio photons aren't as interesting as optical photons**
- **Canada is involved in too many telescopes already**
- **No project should be motivated by measuring $w=-1$**
- **Canada doesn't need international partners**
- **Canada can easily commit to both SKA and ngVLA**
- **Too much planning, not enough science**

STOOPID STATEMENTS FOR THE END OF THE DAY

- **21cm telescopes are very small telescopes**
- **We don't have enough people**

But interferometry gives us hives

And hives are full of workers

So we can solve the man-power with interfometry!