Multi-wavelength Study of Star Formation within G305

James Urquhart
CABB Commissioning Meeting
13 May, 2009
Collaborators

• Project Members
  • Mark Thompson (Hertfordshire)
  • Luke Hindson (Hertfordshire/ATNF)
  • Ben Davies (Leeds)
  • Simon Clark (Open University)

• Motivation
  • G305 - Giant HII region complex is one of the richest sites of massive star formation in the Galaxy
  • Located at ~4 kpc is relatively nearby -
    • offers a unique laboratory in which to study the formation of massive stars
    • examine feedback and interaction processes with surrounding molecular environment
Observations

• Compact Array Observations
  • Multi-configuration mosaic of G305 at 3 and 6 cm
    • 6A, 1.5A, 750D, H214, H168 and H75
  • Trace the distribution of ionised gas on both large and small scales
    • from a few arcminutes to a couple of arcseconds
  • Make a complete census of UC HII regions
  • Measure the propagation of massive star formation into the surrounding molecular clouds
  • Determine the energy input from central clusters to their surroundings
  • When combined with infrared, molecular line and dust maps, the radio observations will reveal the full star formation environment.
G305 in the Mid-Infrared

GLIMPSE Three Colour Image, 3.6, 4.5 and 8 Micron

Observations

• **Observational Setup**
  - Used the H168 configuration
  - G305 region is 1x1 degree in size
  - Need mosaic - used a grid of ~360 points to cover region of interest
  - Three 20 second snapshots were made of each point
    - total integration time of 1 minute per point
  - Total observing time ~ 6 hours (including 1 hour this morning)

• **Problems**
  - The laser transmitting data for Antenna 5 Pol. B was faulty and so all data was lost
  - Tracking of Antenna 3 was poor at low elevations (< 35°), first cycle was flagged
Observations

• Mosaic Grid
Observations

• Mosaic Grid
Observations

• UV-Coverage
Results

• Quick Reduction: 3cm
Results

- Quick Reduction: 6cm
G305: Mid-Infrared + Radio

- Results: 8 Micron GLIMPSE
G305: Mid-Infrared + Radio

- Results: 8 Micron GLIMPSE + 3 cm Contours
G305: Mid-Infrared + Radio

• Results: 8 Micron GLIMPSE
G305: Mid-Infrared + Radio

- Results: 8 Micron GLIMPSE + 6 cm Contours
G305: Mid-Infrared + Radio

• Results: 8 Micron GLIMPSE + 6 cm Contours
G305: Mid-Infrared + Radio

- Results: 8 Micron GLIMPSE + 6 cm Contours
Summary

• Still to come

• Much more to be done to optimise the reduction
• Observations in 3-5 more configurations to be made
ATCA study of protoplanetary disks in rho-Oph star-forming regions at 3mm (C2063)

Luca Ricci (student at ESO), Leonardo Testi & Antonella Natta (Acreti Observatory), Kate Brooks (local ATNF contact)

**PROJECT AIM:** To observe the circumstellar accretion disks in low-mass young stellar objects (YSOs) at different wavelengths to constrain the physical properties of the dust in the disks in order to get more accurate disk mass estimates.

**METHOD:** Observe a sample of YSOs in Taurus (IRAM PdB) and ρ-Oph (ATCA) at millimetre wavelengths

**ATCA OBSERVATIONS:**
Awarded time on 28 & 29 April (2 x 6 hr runs) in H168 array
Six sources observed at 90 GHz, all with clear detections
Additional observations scheduled for June (H75 array)
Protoplanetary disks in rho-Oph at 3mm (C2063, P.I.: Ricci L.)

Flux (integrated) = 15.2 mJy
Rms = 0.15 mJy (40 min on source)
Sensitivity calculator = 0.6 mJy

Flux = 17.8 mJy
Rms = 0.25 mJy (28 min)
Sensitivity calculator = 0.7 mJy

Flux = 15.8 mJy
Rms = 0.20 mJy (28 min)
Sensitivity calculator = 0.7 mJy

Flux = 7.6 mJy
Rms = 0.25 mJy (20 min)
Sensitivity calculator = 0.8 mJy

Flux = 3.0 mJy
Rms = 0.15 mJy (30 min)
Sensitivity calculator = 0.6 mJy

Flux = 2.5 mJy
Rms = 0.15 mJy (40 min)
Sensitivity calculator = 0.6 mJy