Giant HII Regions in the NIR

Elysandra Figueredo, Augusto Damineli e Felipe Navarete (IAG/USP)
Robert Blum (NOAO-EUA) & Peter Conti (JILA–EUA)

Abstract:

We present Gemini North (NIRI) and Gemini South (GNIRS) K-band spectra of newly born OB stars in the obscured Galactic giant HII region W51A and G331.5-0.1 respectively. Our results constrain the distance of both regions, breaking the ambiguity in the distance determinations from radio techniques. O-type stars are identified, classified and the spectroscopic parallaxes indicate a distance smaller than the kinematic values in both cases. As a consequence, both regions are fainter than previously determined. As with the other radio-selected GHII regions we have studied previously, our spectra reveal other massive objects still accreting matter.

Why study Giant HII Regions in NIR?

NLyC = 1.7 ph./sec ~ 13 O7V-type stars

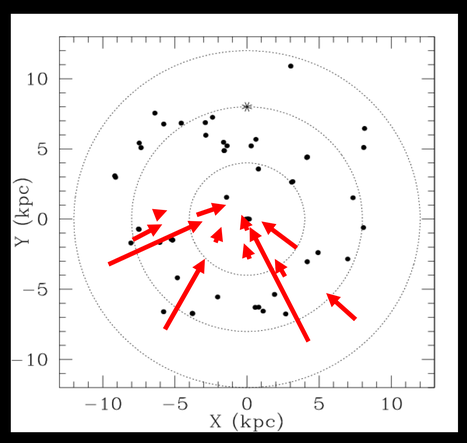
They can address important astrophysical issues such as:

Characterizing the stellar content by deriving the initial mass function (IMF), star formation rate and age.

Determining the physical process involved in the formation of massive stars, through the identification of OB stars in very early evolutionary stages, such as embedded young stellar objects (YSOs) and ultra-compact HII regions (UCHII).

Tracing the spiral arms of the Galaxy by measuring spectroscopic parallaxes for main sequence OB stars and determining distances independent of the based kinematic methods.

Systematic Differences between D_K and D_{SP}:



Problems with the D_{SP} ?

Multiple systems can produce a bias in the distance of ~40% - ΔM_V = +0.7 (2 stars with the same spectral type)

This problem is reduced when a sizable sample of stars are observed

Problems with the Kinematic Distance?

Extrapolation of the Rotation Curve

Non-rotational components - champagne flows in HII regions (±10 Km/s)

Radial Velocities: ambiguity solution and degenerate toward GC

Into the Galaxy Context . . .

Distance Luminosity

Star formation rate 30% lower than previously thought!

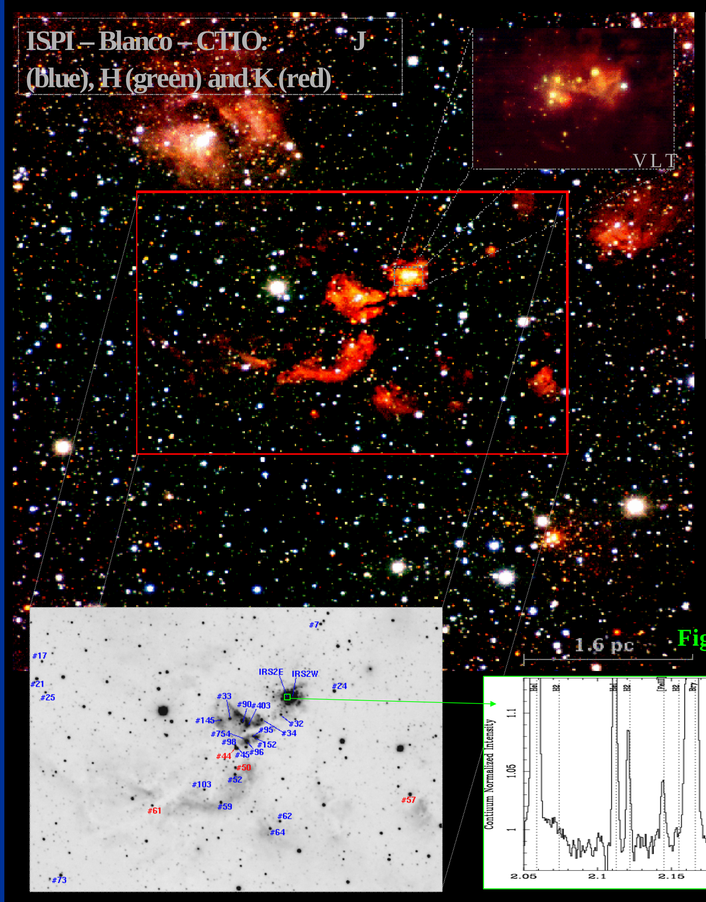
(See Felipe Navarete poster for more about this work !)

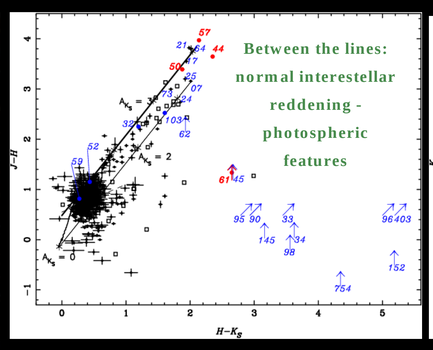
[1] W51 - G49.5-0.4 - R.A.= 19:23:42.02 and DEC. = +14:30:33.56 (J2000)
[2] G331.5-0.1 - R.A.= 16:12:07.78 and DEC. = -51:27:17.8 (J2000)

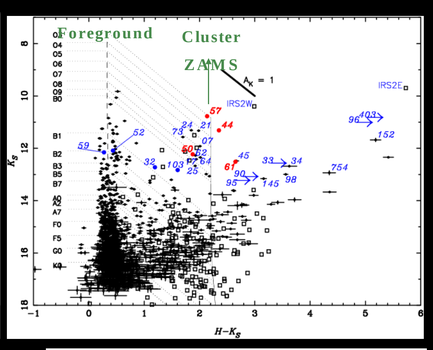
Email: E.Figueredo@open.ac.uk

Thanks:

Gemini North–NIRI–W51A[1]:





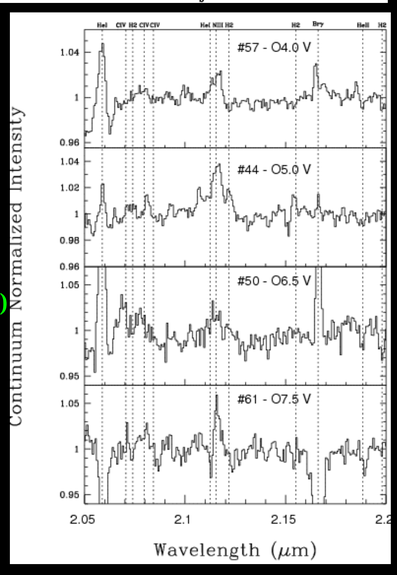


D_K = 5.5 kpc

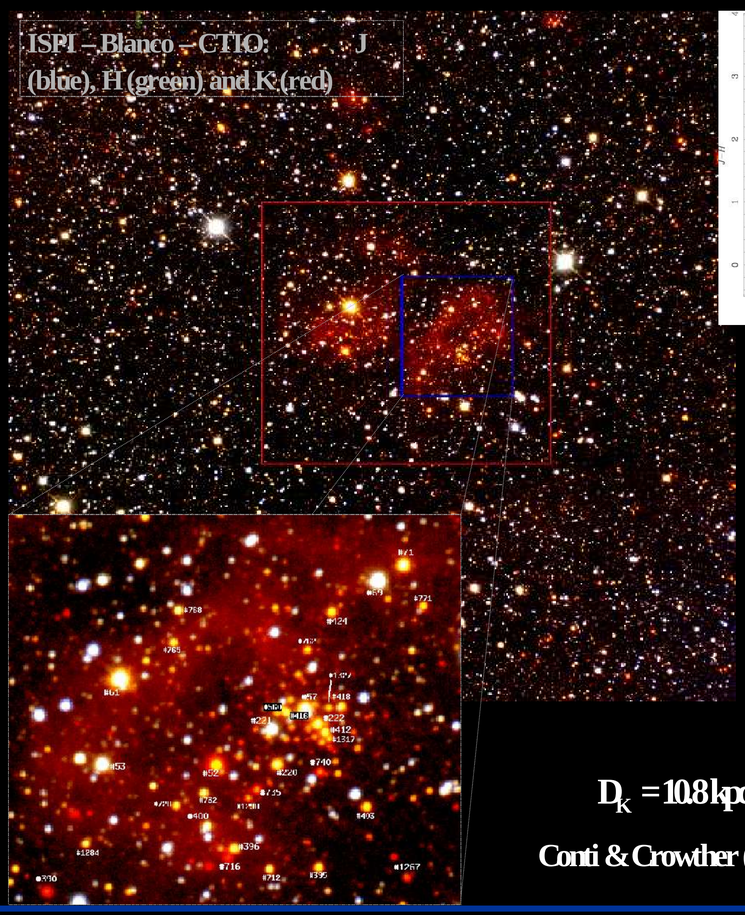
Conti & Crowther (2005)

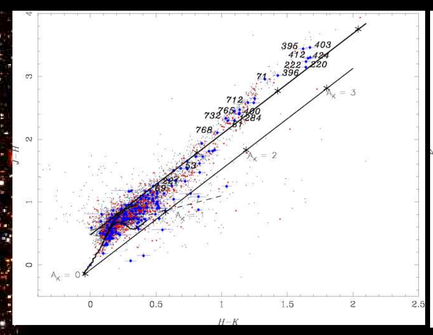
D_{SP} = 2.0±0.3

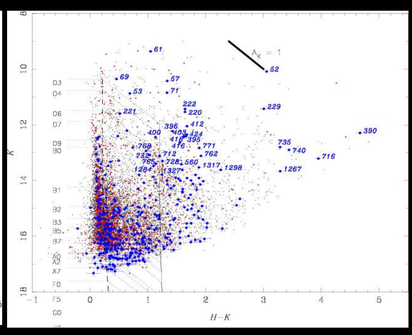
Figueredo et al 2008 , AJ, 136, 221 (published)

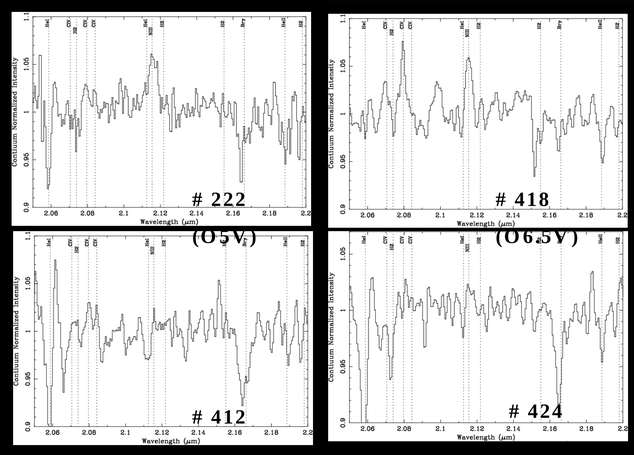


Gemini South–GNIRS-G331.5-0.1[2]:









D_K = 10.8 kpc

Conti & Crowther (2005)

D_{SP} = 4.5±0.3

Figueredo et al 2010, in preparation