

H110 α AND C110 α EMISSION TOWARD THE PHOTODISSOCIATED REGION IN THE GGD14 COMPLEX

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The star-forming complex GGD14:

The GGD14 region (*Gyulbudaghian, A. L., Glushkov, Yu. I., & Denisyuk, E. K. 1978, ApJ, 224, L137*) is located in an active star forming region embedded in the Monoceros molecular cloud at a distance of 1 kpc. This region contains an HII region of cometary morphology (VLA 1) that seems to be ionized by a B0.5 zero-age main-sequence star (ZAMS) with a luminosity of $10^4 L_{\odot}$ (*Rodríguez L. F., Moran, J. M., Ho, P. T. P., & Gottlieb, W. 1980, ApJ, 235, 845*). Recently an expanding HI 21 cm champagne flow with a size ten times larger than the HII region was reported (*Gómez, Y. et al. 2010*). This suggest that the neutral gas is in expansion in a similar way as the ionized gas.

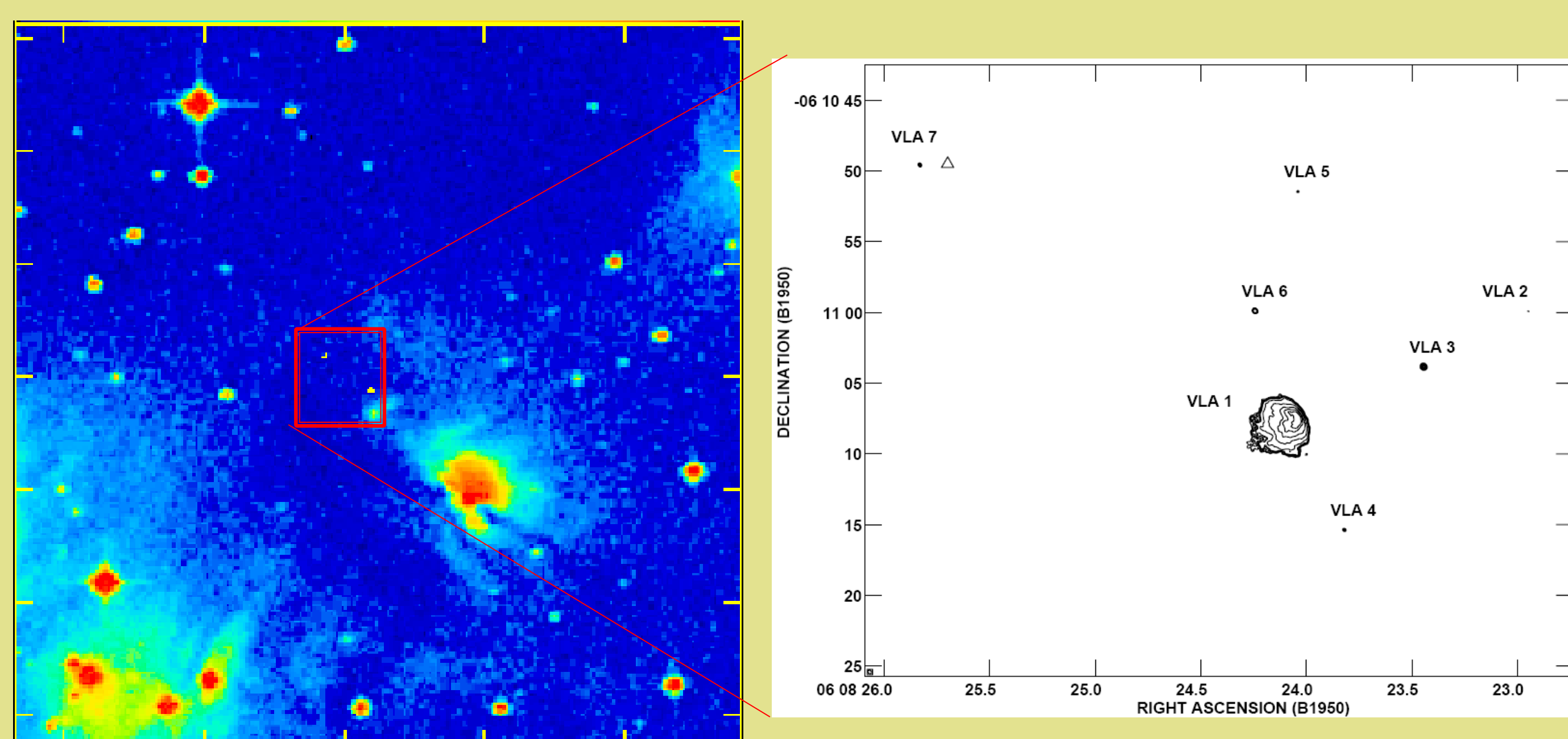


Fig 1: Left: Palomar optical GGD14 image. Right: VLA 3.6 cm image of a cluster of radio sources that includes the cometary HII region (VLA1) (*Gómez, Y., Rodríguez, L. F., & Garay, G. 2000, ApJ, 531, 861*).

Schematic view of a PDR:

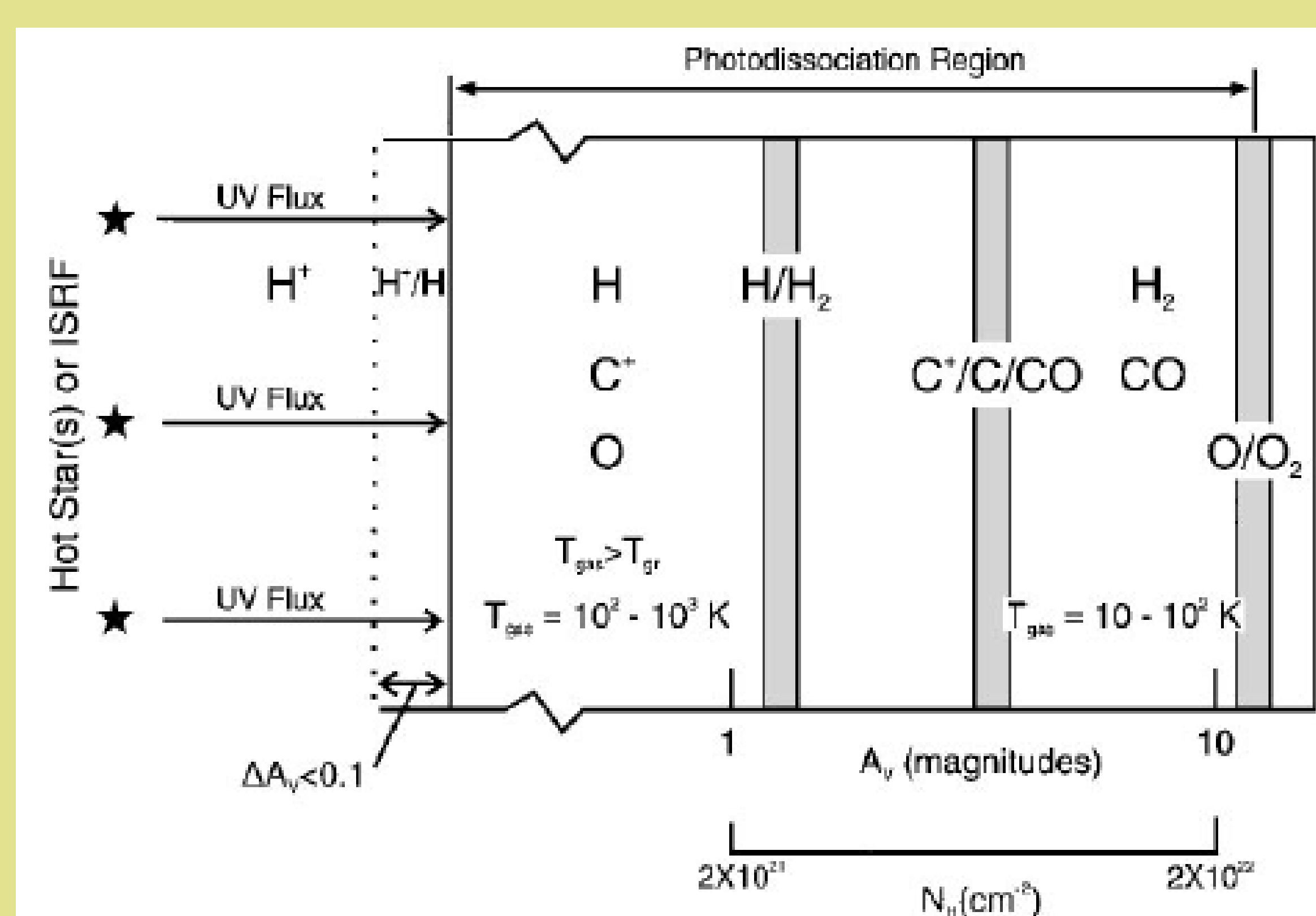


Fig 2: Photodissociated region (PDR) structure (*Hollenbach, D. J., & Tielens, A. G. G. M. 1997, ARA&A, 35, 179*). The PDRs are usually located in between the HII region and the molecular gas.

Observations and results:

The H110 α (4.8744 GHz) and C110 α (4.8768 GHz) radio recombination line observations were made using the Very Large Array (VLA) of the NRAO in the C configuration. Both lines were detected and images were made with an angular resolution of $\sim 6''$.

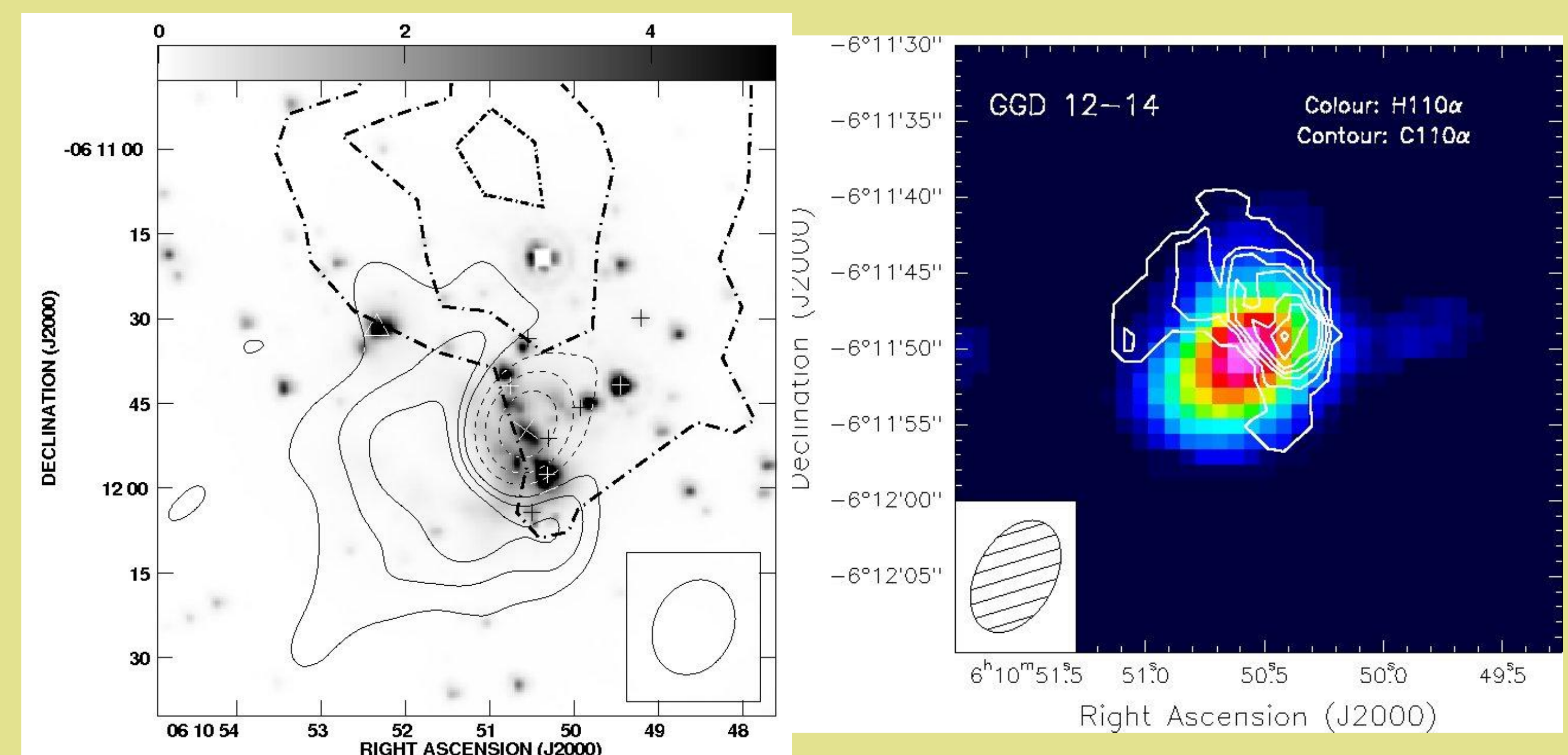


Fig 3: Left: Superposition of 4.5 μ m Spitzer (gray scale), HI 21 cm line (solid in emission and dashed in absorption) and CO (dark dashed) images. Right: H110 α line emission (color scale) and C110 α line emission (white contours).

Main results:

Using the VLA we have spatially resolved the PDR surrounding the cometary HII region toward GGD14. We find that the C110 α line emission exhibits an extended arc structure in between the HII region and the molecular gas, suggesting the presence of a high density PDR, while the HI 21 cm line emission traces a low density PDR, that extends from the NW to the SE.

Future Work:

Using APEX we will characterize the spectral line emission associated with the ionized gas of the HII region (H30 α), the molecular gas CO(1-2) ¹³CS(5-4), OCS(19-18) and some CH₃OH transitions, and the intermediate region tracing the PDR (HCO⁺(3-2), C₂H, CN(2-1)). We consider that the proposed APEX observations to search the lines that are tracing the PDR will allow us to model the chemistry and kinematics of the PDR and the results will be useful to search in the future for PDRs with ALMA.

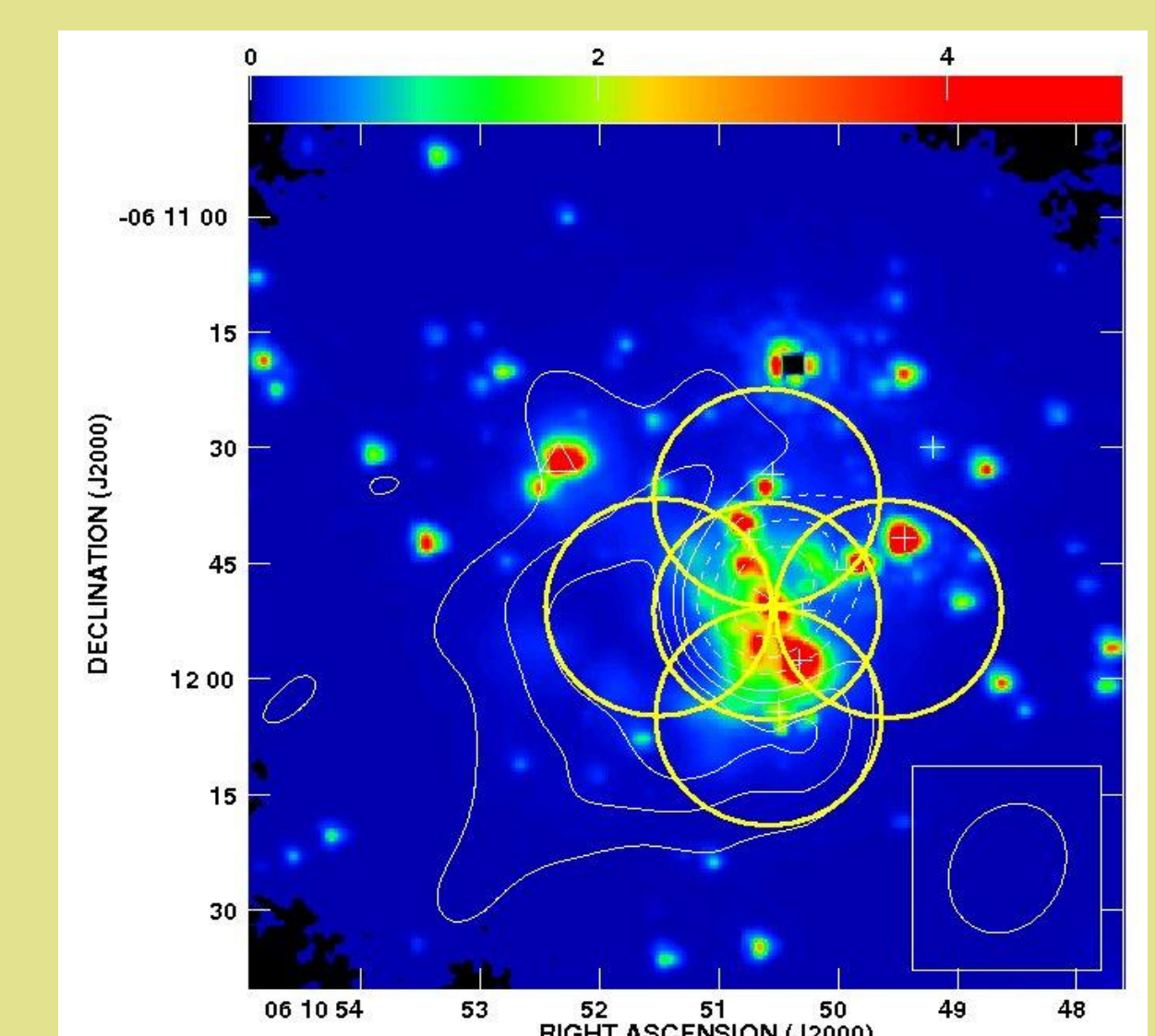


Fig 4: Proposed spatial sampling of GGD14.