

# Photon Dominated Region Modelling of Barnard 68

Jorge L. Pineda<sup>1,2</sup>, Frank Bensch<sup>1</sup>

<sup>1</sup>Radioastronomisches Institut der Universität Bonn, Auf dem Hügel 71, D-53121 Bonn,  
Germany

email: jopineda@astro.uni-bonn.de

<sup>2</sup>Max-Planck-Institut für Radioastronomie, Auf dem Hügel 69, D-53121 Bonn, Germany

**Abstract.** A Photon-Dominated Region (PDR) model is presented for the line emission of the Barnard 68 dark globule. With a roughly spherical morphology and a previously determined density profile, Barnard 68 is an ideal test-bed for spherical PDR models in low-UV radiation fields. This allows the study of the impact of the chemistry in the predicted line emission. We compare the spherically symmetric PDR model by Störzer, Stutzki & Sternberg (1996) to observations of the  $^{12}\text{CO}$   $J = 2 \rightarrow 1$  and  $J = 3 \rightarrow 2$  rotational transitions as well as the [CI]  $^3\text{P}_1 \rightarrow ^3\text{P}_0$  fine structure transition. The analysis shows that Polycyclic Aromatic Hydrocarbons (PAH) have to be included in the chemical network of the PDR model in order to explain the observed [CI] and CO emission. The line intensity of the best-fit model reproduces the observations within  $\sim 30\%$ . Additionally, predictions for the [CII]  $^2\text{P}_{3/2} \rightarrow ^2\text{P}_{1/2}$ , [CI]  $^3\text{P}_2 \rightarrow ^3\text{P}_1$ ,  $^{12}\text{CO}$   $J = 5 \rightarrow 4$ , and  $J = 4 \rightarrow 3$  transitions are presented. Observations of these transitions with future instruments (APEX, NANTEN2, HERSCHEL, SOFIA) will allow to test our PDR model of Barnard 68.

**Keywords.** astrochemistry – ISM: globules – ISM: molecules – ISM: individual (Barnard 68)

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## References

Störzer, H., Stutzki, J., & Sternberg, A. 1996, *A&A* 310, 592