

# 30 Years of Photodissociation Regions:

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## The physics and chemistry of photon-dominated clouds in NGC 3603

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High-mass star-formation in the interstellar medium is one of the main open questions in astronomy. Stars are born within molecular clouds due to the perturbations of local physical and chemical processes.

To investigate these perturbations, we observed one of the most prominent HII region, NGC 3603, in our Galaxy. This molecular cloud complex embraces a massive open cluster, which provides strong stellar winds and radiation field. These phenomena heavily interact with the neighbouring environment and govern the local physics and chemistry.

To investigate the aforementioned effects and their influence, we received spectroscopy data of molecules, ions and atoms via Herschel Space Observatory (Pilbratt et al., 2010). In addition, measurements of the same species with ground-based telescopes were also used as complementary data.

The observational results showed that the observed molecular clouds have gas components with different temperatures as well as vigorous gas movements.

Different theoretical models were used (KOSMA- $\tau$ , Röllig et al. (2006) and RADEX, van der Tak et al. (2007)) to fit the observational results. We found that the observed line intensities and abundances of given species match with the model predictions and the model results are independent from the cloud geometry.

All the results we obtain, give the opportunity to characterize the physical conditions and chemical processes within NGC 3603. Based on our observations and our model calculations, we concluded that the observed molecular clouds (or part of them) are probably in gravitationally unstable stage. Hence, the star-formation process within NGC 3603 is still ongoing. This scenario is in agreement with previous studies. It is also likely, that the observed clouds do not rotate as a rigid rotor but have a torsional geometry. On the other hand, due to observational facts (e.g., large beam size, distance of NGC 3603), we were only be able to make statements about the chemistry/chemical stratification within certain limits.

## REFERENCES

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