Chemical composition of comets atmospheres using the TRAPPIST telescopes

SUMMARY.

Comets are among the best preserved specimens of the primitive solar nebula. This status of "fossils" gives them a unique role in understanding the origins of the solar system. The success of the Rosetta space mission was very important and is changing our knowledge about comets. But it showed also that observations from the ground continue to be important: they make it possible to supplement the data in situ by obtaining information on larger scales of the coma and tails, and for a much larger number of comets, which is necessary to extrapolate the results to the entire cometary population. The link between the composition of comets and their dynamic history must still be clarified and a complete comet classification is still missing.

— OBJECTIVES

- **Knowledge**, Observing and analyzing the coma of bright comets using the TRAPPIST telescopes, focusing on gas and dust emissions and in particular the gas production rate calculations.

- **Skills** Preparing observations, data calibration, how to analyse them, and how to interpret them.

— INSTITUTE

The work will be done in the comet group of the OrCa Service (+1) at the STAR Institute of the University of Liège and the TRAPPIST team.

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— APPLICATIONS

by Emmanuel Jehin

We propose the observation and analysis of the coma of two or three bright comets with the TRAPPIST telescopes network (Jehin el al. 2011). These robotic telescopes installed by our team in Chile (in 2010) and in Morocco (in 2016) are equipped with narrow band filters to isolate the emissions of different gases and dust contained in the atmosphere of comets. The student will have to prepare the observations, make plans to send to the robotic telescopes, calibrate the data and calculate the production rates of the different gases using the so-called Haser model (1957). The necessary tools for this kind of measures have already been developed in our team. The student will have to become familiar with the various techniques, adapt and improve if necessary the reduction procedures and scripts and run the models with our help. The results might lead to the publication of a short article with our group.

— EVALUATION

- `Theory grade [30%]`
  - Student will be asked to write a report and prepare an oral presentation, followed with questions.

- `Practice grade [30%]`
- `Defense grade [40%]`
  - Oral and slides quality
  - Context
  - Project / Personal work
  - Answers to questions

— BIBLIOGRAPHY & RESOURCES

- https://www.trappist.uliege.be/
- Jehin et al. (2011)

— CONTACT

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