Report on the joint UCL-French workshop on 'Our Chemical Origins'

Report prepared by Professor Serena Viti (Physics and Astronomy Department)

1. Executive Summary

The workshop entitled "Our chemical origins", funded by the French Embassy in London, was held in E7, in the Physics and Astronomy Department on the 18 and 19of November. The workshop was co-chaired by Professor Viti (UCL) and Professor Ceccarelli (IPAG, Grenoble). The Main objectives of the workshop were:

1. To discuss and summarize the results of two long-standing collaborative projects on the exploitation of the data acquired within the ESA Herschel Key Project CHESS (Chemical HErschel Surveys of Star forming regions)
2. To consolidate links between the modelling team at UCL and the observational team in Grenoble and Toulouse.
3. To prepare a strategy for a European commission thematic programme.

We had 13 participants, 7 from the department of Physics and Astronomy (2 members of staff, 1 post-doc and 4 PhD students), 5 from the IPAG in Grenoble and 1 from Toulouse. Apart from two of the PhD students, all participants gave a presentation about their work. Moreover we had two 'guest' speakers: Cat Mora, a Research Facilitator from the BEAMS School Office of the Vice-Provost (Research), and Michael Browne from the UCL European Office: they each gave a short presentation on the new EU Horizon 2020 program. All the names of the participants can be found in the programme below. The two students who did not present a talk were Richard Rollins and George Kelly.

2. Workshop programme

18 November

13:45-14:05 Cecilia Ceccarelli (IPAG, Grenoble): "Overview of the Herschel GT program CHESS"

14:05-14:45 Bertrand Lefloch (IPAG, Grenoble): "Overview of the ASAI program"

14:45-15:05 Emmanuel Caux (CESR, Toulouse): "Observational Results on L1544"

15:05-15:25 Ana Sepulcre (IPAG, Grenoble): "Observational Results on OMC2-FIR4"

Tea and coffee break 15:25-15:50

15:50-16:10 Laurent Wiesenfeld (IPAG, Grenoble): "Updates on the computations of collisional Coefficients"

16:10-16:30 Nadia Balucani (IPAG, Grenoble/Perugia University): "Updates on gas phase

experiments of rate reactions"

16:30-17:00 Michael Browne from the UCL European Office

17:00-18:00 Discussion

18:00-19:00 Drinks in the Houseman room followed by dinner at TAS

19 November:

9:30-9.50: Serena Viti (UCL): "An Overview of astrochemical and radiative transfer modelling at UCL"

9:50-10:05 Thomas Bisbas (UCL): "Modelling the Atomic-to-Molecular Transition and Chemical Distributions of Turbulent Star-Forming Clouds"

10:05-10:20 Jonathan Rawlings (UCL) "Understanding the formation of simple and complex molecules during low mass star formation"

10:20-10:35 Hannah Calcutt (UCL)"Tracing massive star formation with complex molecules"

10:35-10:50 Antonios Makrymallis (UCL)"Formation and evolution of dust grain ices"

Tea and coffee break 10:50-11:20

11:20-11:50: Cat Mora from the UCL Beams School office

12-14 Brain storming sessions/discussions on

3 Outcome of the Workshop

The workshop was extremely fruitful from several points of view. First of all we were able to exchange results on ongoing observational and theoretical studies of molecules in star forming regions (see Figures 1 and 2 for an example of the type of objects that we are studying with the CHESS and ASAI survey), in particular (i) the ongoing analysis of the CHESS and ASAI observational projects; (ii) the latest computation of collisional coefficients for interstellar molecules and new experimental surface reaction rates for complex molecules; (iii) the recent developments in astrochemical and radiative transfer modelling. Secondly, the focussed program allowed much synergy despite the participants being from different disciplines (computational and experimental chemists, astronomers, chemical and radiative transfer modellers). One of the major impacts of this workshop has been the dissemination of results into diverse academic communities. Thirdly, by the end of the workshop, we were able to outline a strategy for the next EU Horizon call: in particular we came to the conclusion that our team and our project was very suitable for the Horizon SPACE program (the call will come out in January).

Finally, some of the participants were young researchers (PhD and postdoctoral fellows) who benefitted from the established and relatively small group in different ways: the informal

setting of the workshop, the small number of participants and the fact that most of the senior ones knew each other was an ideal platform for the PhD students and postdocs to present their work, to have informal discussions with senior members, also over drinks and dinner and to start creating a network outside UK. In particular, the modeling work performed at UCL was of great interest to the French astronomers and chemists and new collaborations, involving more actively the PhD students, have initiated.

4 Where to next?

We have already arranged another small workshop at UCL for the middle of January, where we will concentrate on the modelling of some of the data that were presented at the workshop. As soon as the EU Horizon call is out Prof Ceccarelli and Prof Viti will start coordinating the writing of the project involving the whole group of participants; the aim will be a project based mainly at UCL, IPAG and Tolouise, with the participation of the Arcetri Observatory and the Chemistry Department at Perugia University.

5 Finance

The funds provided have been spent to pay for the travel and subsistence of the French participants (1 night). They have also been spent on lunch and refreshments for all workshop participants during the workshop and for the workshop dinner. The final costs have not yet been calculated as we are awaiting the receipts and expense claims from some of the French participants. These will be reported in a follow-up e-mail.

6 Final Remarks

The authors of the report would like to express their gratitude toward the French Embassy for funding the workshop. It has given us the opportunity to participate to technical talks with French researchers working in the field. The synergies between the guest and UCL academics have already generated new and fascinating research ideas that will form a basis to build strong and thriving collaborations.

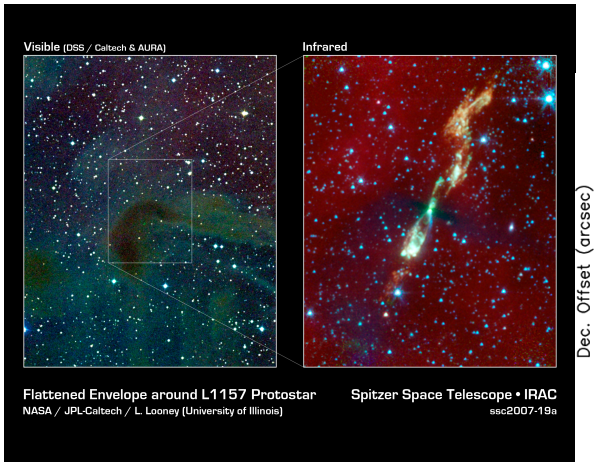

Figure 1: Optical and Infrared images of the chemically rich outflow L1157.

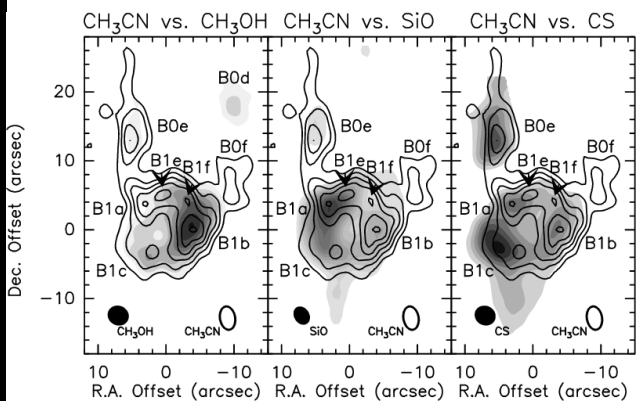

Figure 2: Submillimeter observations of molecules in L1157 taken at very high spatial resolution.