

Preface

A few years ago, a motivation for organizing one more IAU Symposium on star formation in Grenoble, was the anticipated completion of the IRAM interferometer on the Plateau de Bures, close to Grenoble. This choice was also a sort of late celebration of the genius of Joseph Fourier, born in Grenoble, whose work is the very foundation of interferometry. At the time when we finally announced the advent of this conference, the first reactions we got from the community were expressions of saturation and even reject, the Symposium being unfortunately scheduled almost simultaneously as two other major meetings on closely related topics, and sponsored by different organizations. A wave of disappointment then reached the organizers. Some of us were enthusiastic enough to help the others overcome their discouragement. Let them be thanked here.

There was, indeed, a deeper motivation for organizing this conference. It was to trigger the meeting and communication of physicists and astrophysicists since many of the difficulties met now in understanding the physics of the interstellar medium and its evolution toward star formation are common to several, if not most, other fields of physics. They are assigned to one origin: complexity. In particular, and at the opposite of what was thought one decade ago, the process of star formation is no longer understood as a local process but depends on more global parameters in the sense that the non linearity of the mechanisms which regulate the physics of the interstellar medium makes all the scales coupled. Another major difficulty, also common to other fields, is the fact that the systems under study are far out of equilibrium. At last, the observed quasi equipartition of the various forms of energy (thermal, radiative, magnetic, turbulent, cosmic rays...) is an additional source of complexity. Several physicists were invited, they expressed their interest in the meeting and agreed to give talks. In the end, only few of them actually came, perhaps because of the foreseen difficulty in communicating, perhaps also because the complexity of the interstellar medium is closer to that of biological systems than that met in pure physics and the approach we follow in astrophysics is still too phenomenological.

In spite of that, we believe that this conference helped most of us, getting some grounds in fields of physics we were not familiar with. We heard: "In all the conferences where I have been in the past, each time I could not understand what was being said, I believed that I was the only one to be in that state. At this conference, it was clear at once that everyone was like me" (Don Cox). We also heard from an young hydrodynamicist: "A length for me has always been 2π . I am glad to have discovered what a real length is." And if there was as always in that sort of meeting a lot of healthy controversy, there may have been, according to many, much more modesty in everyone's mind than usual. We were all ready to accept the failure of some of the models we had been working on for years and were discovering, paper after paper, the unavoidable coexistence of the remarkable uniformity and order of the interstellar medium when looked at on large scale which singularly contrasts with the ever increasing (and somewhat disheartening) level of diversity and complexity that small scale observations steadily reveal to us.

We made the choice to record in this volume all the contributions to the Symposium. The only exception is what was said in the panel discussion, chaired by Alex Dalgarno and

devoted to "Observational tests of fragmentation processes" because most of the ideas and arguments which emerged during the discussion are indeed included in the contributions. The review and invited talks are gathered in the first half, together with the few oral contributions. We found that the large body of information presented in the poster sessions deserved publication and we present them in the second half of the book.

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