



Instabilities and Structures in Proto-Planetary disks

Preface

This workshop was held in Marseille on September 17–20, 2012. It was sponsored by AMU and took place in the building of the most ancient astronomical observatory of the city, and also at Laboratoire d'Astrophysique de Marseille (LAM). It was attended by 40 international participants from Europe (80%), the US (15%), Russia and Japan.

The meeting addressed the evolution of the proto-planetary disks at the decoupling stage, an important question for the models of planetary formation. The problem shares significant similarities with the study of stratified and rotating two-phases flows in fluid mechanics and inspired a number of recent laboratory experiments. The goal of the meeting was to discuss recent developments in the field, focusing on the formation and lifetime of coherent gaseous structures, on their ability to capture the solid material and to survive once dust loaded. Emphasis was placed on the hydrodynamical aspects of the problem but MHD processes were also presented. The following topics were addressed and discussed during the meeting:

- the possibility to observe dusty structures in the proto-planetary disks with ALMA;
- the formation of coherent vortices under the Rossby-Wave or the baroclinic instabilities;
- the evolution of the vortices (migration, stability against the elliptic instability, lifetime, ...),
- their ability to capture the solid material and to survive, once loaded, against other instabilities,
- the role and importance of the disk self-gravity.

The heart of the discussions was the possibility to build a scenario in which vortical motions induced or amplified by the various instabilities (Rossby wave, baroclinic, streaming) can cooperate to gather the solid particles in the first gravitating planetesimals.

We warmly thanks the reviewers for introducing the various topics, the participants for lively discussions and the scientific committee for his help.

Scientific Organizing Committee:

John Papaloizou (University of Cambridge), Hubert Klahr (Max-Planck-Institute),
Philip Marcus (University of Berkeley), Stéphane Le Dizés (IRPHE/CNRS),
Satoshi Inaba (University of Waseda), Pierre Barge (LAM/ Aix-Marseille University).

A first meeting entitled "Planetary formation: toward a new scenario?" held in Marseille 2–3 June 2003. At that time the goal was to bring together the few people interested in studying the consequences of vortices in protoplanetary disks and their possible impact on the standard scenario of planet formation. We hope to organize a next meeting on the future developments of these ideas.

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