Report on the International Workshop on

Observing Planetary Systems

held at ESO, Vitacura, Chile, 5-8 March 2007

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Motivation

Nowadays, the ESO premises in Vitacura host more than 80 PhD students. fellows and astronomers, and represent the research centre for the scientific staff deployed at the different observatory sites in Chile. Several topical working groups help locally to actively promote and foster joint research initiatives among ESO scientists. One example is the "Planetary Sciences Research Group" at ESO Chile (http://www.sc.eso.org/santiago/science/ PlanetaryGroup), which seeks to understand the formation of planetary systems at large and the place occupied by our own Solar System. Group members are actively involved in observation-oriented programmes making use of ESO facilities to carry out front-line research ranging from discoveries of new brown dwarfs and exoplanets, to the study of primitive Solar System bodies.

Encouraged by the fruitful interdisciplinary research approach of our own group, we proposed to gather both communities of Solar System and extraplanetary system scientists and organise the international workshop "Observing Planetary Systems". The main idea was to explore the synergy between these two communities and confront them with four key topics: from Discs to Planets; Search for Planets; Planetary Chemistry; Towards other Earths. In order to establish such meetings as part of our research culture, we selected the venue to be in our refurbished, large, conference room in Vitacura, equipped with state-of-the-art audio-visual facilities.

The response from the community was overwhelming. While our original plans were to limit attendance to 60–80 participants, nearly 120 scientists participated in the workshop, many of them worldwide recognised leaders in their field: about half of the participants were from European countries, 20% from the USA, 20% from Chile, 5% from other South American countries, and a few researchers joined us from Japan and Australia. A healthy number of students (~ 30% of the participants) demonstrated the attractiveness of the field for the next generation of researchers. Each of the four sessions was organised around three presentations by invited speakers, each of 45 min, all contributing to the discussion from a complementary perspective of Solar System and extraplanetary sciences. The addition of contributed talks and a large number of posters deepened our understanding of each subject. All available time-slots were intensively used for lively and open discussions and some poster pop-up sessions were organised at the end of each day.

Scientific highlights

A few subjectively selected highlights may demonstrate the scientific ideas and prospects presented during this workshop.

The physical, chemical, and morphological evolution of circumstellar discs from gas-dominated rotating optically thick structures towards thin planetesimal discs is a key to understand the formation of planetary systems in general, and our own Solar System in particular. Disc models can be best constrained by applying a combination of modern observing techniques, utilising the highest spatial resolution imaging in the optical and NIR in scattered light, polarimetry and SED determination. Dust settling, i.e. the vertical segregation of particles with different masses and sizes can now be directly probed (Menard). The dynamical history of our own Solar System, as reconstructed by sophisticated numerical N-body integration, teaches us characteristic differences and/or similarities with known extrasolar systems, such as why does our Solar System not have a hot Jupiter? The most likely reason is the resonant hierarchical configuration of our four gas giants. Late heavy bombardment, a cataclysmic episode of planetesimal infall on terrestrial planets, requires a large reservoir of planetesimals and appears therefore compatible with the dust excesses observed in debris discs (Morbidelli). Accuracy limits of radial velocity searches for exoplanets are continuously improving, and the physical limits have still not been reached (contrary to what was thought ten years ago). Precision RV studies will continue to be

of highest relevance for the massive follow-up of planetary transit candidates (Queloz).

Direct imaging of extrasolar planets is a key science driver for many future groundand space-based instrument developments. A few extrasolar giant planets (EGPs) around nearby young stars are already in reach of current adaptiveoptics assisted NIR companion search programmes, and a leap of the astrophysical understanding of EGPs is expected with the next-generation high contrast imagers, like SPHERE (Mouillet). Astrochemistry provides another important link from our own Solar System to other planetary systems. Deuterium-tohydrogen ratios appear remarkably similar in comets and in the interstellar medium (Kamp). Comets, as messengers from the early Solar System, may reveal the answer to questions like, why is the Earth wet and alive? (Mumma). Transiting (eclipsing) planets play a key role in understanding their physics and chemistry. Atmospheres of hot Jupiters can be studied in detail by transmission spectroscopy, while mass-radius-composition relations allow the interior of super-earth planets to be probed: the era of comparative exoplanetology has just started (Charbonneau)!

The search for signatures of life on exoplanets by the detection of atmospheric and surface biomarkers is a far-reaching goal of future, ambitious, space-based missions. Both ESA and NASA are actively promoting missions not only to detect, but also to characterise, the physical conditions of terrestrial planets (Fridlund, Lawson). Today, Earth is still the only known planet that hosts life, and it can serve as a template to discuss potential biosignatures in other habitable worlds. The search for life beyond our Solar System may soon become a reality – exciting times are ahead (Kaltenegger)!

Contributed talks and posters presented the latest results from ground-based and space-based (e.g. Spitzer) observatories in the search for exoplanets and the study of planetary-system formation, including our own. The prospects for future ground-based interferometric, radialvelocity and high-contrast imaging instruments in the field of exoplanet search Participants at the workshop on "Observing Stellar Systems" photographed in the garden at ESO Vitacura.



were presented, while several contributions highlighted the importance of combining *in situ* spacecraft missions of the planets and small bodies of our Solar System with ground-based supporting observations (Cassini/Titan, Rosetta/ Churyumov-Gerasimenko, Mars space missions). Although we are still lacking evidence for the presence of life outside the Earth, the discussions generated during this four-day workshop deepened our belief that the search for signatures of life in our own Solar System will provide strong guidance to the future exploration of exoplanetary systems.

Summary

On purpose we opted not to publish printed proceedings of this workshop. In-

stead, all contributions, both oral and poster, were made available for download immediately after the workshop from the conference website (http://www.sc.eso. org/santiago/science/OPSWorkshop) given the consent of the authors. This decision was based on our belief that providing instant access to the research highlights presented during this meeting was more useful than waiting for printed proceedings in a competitive field like this one, where results are rapidly evolving and will be published in refereed journals. The idea to provide near-instantaneous access to the material discussed in this workshop was developed even further by providing, experimentally, a live-stream webcast during the conference (videostreams are also available for download on the conference website). We also believe that the costs saved have been

well invested in making an attractive programme, and supporting some participants to enable their visit in Chile. In total about 40% of the participants received some financial aid; half were students, half researchers, and all students had their registration fees waived.

We would like to thank ESO for allocating the financial support for this workshop, and the Pontificia Universidad Católica de Chile its co-sponsoring. Also, we would like to thank all people who made this workshop possible, in particular Maria-Eugenia Gomez, our librarian who acted as workshop secretary, the ESO-Chile administration for the logistical support received, and the students from the Universidad Católica de Chile, who helped during the four days of this workshop, notably at the time of the registration. The flawless local organisation, the highly praised coffee breaks (including delicious appetisers), joint cocktails and conference dinner all contributed to a warm and friendly atmosphere during the workshop, remembered by all participants.

While meetings of this quality and size take place naturally in many research institutes in Europe and North America, ESO Vitacura largely lacks this experience and we are looking forward to future workshops of this kind organised within our premises.

The Re-launch of the ESO Web

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Recently, the ESO Web went through a major revision and was re-launched with a new Look and Feel and new navigation tools. This article gives an overview of why and how the ESO Web has changed.

The ESO Web plays an integral and indispensable role in the process of doing science with ESO's observing and archive facilities. It provides an effective and adaptive medium for exchanging information, documents and images between scientists, engineers, the media and the general public. Furthermore, it provides various services to the community of users of ESO's observing facilities and is critical for coordination and dissemination of information, both internal and external to ESO, in particular in the area of science and archive operations.

The ESO Web started its service in 1994. Since then it has expanded rapidly, both in the amount of information and services that are provided as well as in terms of access rates. Currently, the statistics