Report on the International Workshop on

Star Formation Across the Milky Way Galaxy

held at ESO, Vitacura, Chile, 3–6 March 2008

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The workshop "Star Formation Across the Milky Way Galaxy" brought four days of intensive scientific discussions and excellent presentations to our Vitacura premises in Chile. The idea of the workshop was to trace star-formation activity spatially spanning outward from the Solar Neighborhood, nearby star-forming regions and OB associations, to spiral arms, the Galactic disc, around the central bar and bulge, and towards the Galactic Centre. We aimed to link different communities that usually work on specific scales and environments, and thus had asked some of the most prestigious and acknowledged scientists in the field to help to develop a synoptic view of our current understanding of Galactic star formation. Almost all speakers in our 'wish-list' immediately agreed to come the long way down to Chile. This event confirmed once again that ESO/Chile and its faculty have become a prime address for international conferences of the finest scientific quality (see also the report on last year's conference on "Observing Planetary Systems", reported in The Messenger, 128, 72, 2007).

We present a short summary of some, subjectively selected, scientific highlights that were discussed during the workshop. All 45 oral presentations and 19 posters contributions can be accessed and downloaded through a dedicated page: *http://www.eso.org/sci/meetings/MilkyWayStarFormation/*

Intended as a 'prelude' to the entire workshop, global star formation was introduced by Bruce Elmegreen, who outlined the main physical processes responsible for large-scale structuring in galaxies: gravitational instabilities; turbulent compression; and sequential triggering. The predictions of fundamental theoretical considerations appear to agree well with the observed global structure of star-formation regions in galaxies.

Starting with the immediate Solar Neighborhood, the closest star-forming regions allow the most detailed, and highest spatial resolution studies, as reviewed by João Alves. He highlighted the power of the near-infrared cloud extinction mapping (NICER) technique, and discussed the relation of cloud core stability to the stellar initial mass function, and multiplicity. John Bally gave an impressive view on star formation in the Orion complex, the nearest site of ongoing high- and low-mass star formation. Orion allows to address some of the most fundamental questions in star formation, such as: How do massive stars form? Do most stars form in clusters? Are dynamical processes dominant during star formation? In addition, Thierry Montmerle pointed out the relevance of the high X-ray activity of young stars to star and planet formation through the effects of feedback. UKIDSS and the GLIMPS survey enable deep views into star-formation activity in the Galactic Plane and were highlighted by Phil Lucas.

The classical picture of the relation of star formation and spiral density waves in galactic discs was reviewed by Preben Grosbøl, and the models of spiral shocks including clumps, magnetic fields and bars remain an active field of research, given the difficulties and uncertainties to precisely map the spiral structure of our Galaxy on the far side (Leo Blitz). In this context, more global agents like the interaction with satellite galaxies, and in particular the LMC, may act as an external trigger for star-forming activity in the outer parts of the Milky Way (Giovanni Carraro).

Is there a dominant mode of star formation? According to Tom Megeath, and his impressive collection of images showing the spatial distribution of young stars based on Spitzer, Chandra and ground-based surveys, there is a continuum of scales and environments in which star formation happens, ranging from relative isolation to the densest regions in Giant Molecular Clouds (GMCs). This view is backed up by the analysis of hierarchical structures and substructures, and favours a scale-free fragmentation and formation process.

Is the stellar Initial Mass Function the same in clusters and in the field? According to Jorge Melnick, there is no evidence to assume the contrary (e.g., a top-heavy IMF), based on careful analysis of the stellar masses in several young massive clusters. Another, often controversial,

The participants at the ESO/Vitacura conference on "Star Formation across the Milky Way Galaxy" assembled on the lawn.

aspect of star formation in clusters is early mass segregation as expected from N-body models, and Joana Ascenso cautioned against an interpretation without careful consideration of the low-number statistics at the high-mass end. Mark Gieles examined the short, but dramatic, phase when expulsion of natal gas from clusters results in "infant mortality". Hans Zinnecker reminded us that probably up to half of all stars in the Milky Way form in open clusters.

Stellar populations towards the inner bulge and bar were reviewed by Fred Schuller (as seen through ISO, Spitzer, and APEX), and Livia Origlia (through characterisation by their kinematical, chemical and evolutionary properties, mainly from near-infrared spectroscopy). Towards the Galactic Centre a somewhat surprisingly high star-forming efficiency and rate are found, as evidenced either by the strong X-ray emission (Sergei Nayakshin), or by the apparent over-abundance of many young O stars in the immediate surroundings of the massive black hole at the centre of our Galaxy (Andrea Stolte), which seems to bias the IMF in this environment.

Francesco Palla concluded and summarised the workshop with an excellent 'postlude'. With our current understanding, the 'problem' of star formation is probably not solved. There is a bewildering diversity of star-forming regions, and a continuum of star formation from isolation to dense clustering, on many scales, and no single theory may be able to catch and explain all relevant processes. It remains also to be seen if global scaling relations, such as the relation of gas densities with star-formation rates known from other galaxies, hold in the Milky Way.

Coffee breaks including ample snacks, well-organised poster exhibitions, and delicious cocktails in the garden of our Vitacura office contributed to the friendly and stimulating atmosphere of this workshop. The conference dinner in the vineyard *Casa del Bosque* will remain a memorable event for many participants. Many thanks to Maria-Eugenia Gomez and her team who, once again, managed flawless and efficient local organisation for more than 100 guests. We are all looking forward to next year's ESO workshop hosted in our ESO-Chile 'science headquarters'!

Announcement of the

ESO Workshop on Large Programmes

13–15 October 2008, Garching, Germany

Over the first ten years of science operations of the VLT, 15 % of the science time has been devoted to the execution of Large Programmes. In May 2003, ESO organised a Large Programmes workshop to obtain a first assessment of the scientific return of Large Programmes. In agreement with its Observing Programmes Committee (OPC), ESO is planning a further overview of the scientific results achieved through Large Programmes conducted at the La Silla Paranal Observatory. To this effect, ESO is organising a three-day workshop in Garching.

The workshop will feature scientific presentations of all Large Programmes that have been completed since the May 2003 workshop. The teams of investigators in charge of these Large Programmes will be invited to present their scientific results, and the impact that their project has had on its particular field. The presentations will be followed by a discussion session on the general scientific impact of ESO facilities.

One of the outcomes of the May 2003 Large Programme workshop was a suggestion that ESO store the legacy data products of Large Programmes in its science archive. This suggestion was implemented with the requirement that Large Programmes that started after 1 April 2005 deliver Advanced Data Products (ADP) to the ESO archive at the time of publication of their results in a refereed journal. The workshop will also feature a presentation of the ADP submission process and a discussion of its value to the ESO scientific community.

For further details of the workshop, please refer to *http://www.eso.org/sci/meetings/LP2008/*, where the registration form can also be found. The registration deadline is 15 July 2008.

Photo: H. H. Heyer, ESO