

COMMISSION 37

STAR CLUSTERS AND ASSOCIATIONS

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1. Introduction

Star clusters are valuable tools for theoretical and observational astronomy across a wide range of disciplines from cosmology to stellar spectroscopy. For example, properties of globular clusters are used to constrain stellar evolutionary models, nucleosynthesis and chemical evolution, as well as the star formation and assembly histories of galaxies and the distribution of dark matter in present-day galaxies. Open clusters are widely used as stellar laboratories for the study of specific stellar phenomena (e.g., various emission-line stars, pulsating pre-MS stars, magnetic massive stars, binarity, stellar rotation, etc.). They also provide observational constraints on models of massive star evolution and of Galactic disk formation and chemical evolution.

2. Publications

Star clusters have continued to receive much attention within the scientific community during the past three years. In the period from January 2006 until September 2008, about 420 papers related to globular clusters have been published in refereed journals (measuring already more than 3100 citations), 270 on open clusters (with 665 citations) and 30 on associations (140 citations). The papers cover a multiplicity of subjects, including issues related to the formation and dynamical evolution of star clusters, stellar evolution and ages, star clusters as tracers of stellar populations, studies of specific types of objects within clusters, nuclear clusters and extragalactic cluster systems, while the authors utilize observations covering an increasing portion of the electromagnetic spectrum, ranging from X-rays to the far-infrared, as well as advanced N -body simulations.

3. Symposia, colloquia and reviews

During the reporting period several international conferences, workshops, meetings and schools, related directly or indirectly to star clusters, have taken place:

- MPA/ESO/USM/MPE 2008 Joint Astronomy Conference *Chemical Evolution of Dwarf Galaxies and Stellar Clusters*, 21-25 July 2008, Garching, Germany
- IAU Symposium No. 255 *Low-Metallicity Star Formation: From the First Stars to Dwarf Galaxies*, 16-20 June 2008, Rapallo, Liguria, Italy
- *Nuclear Star Clusters across the Hubble Sequence*, 25-27 February 2008, MPI for Astronomy, Heidelberg, Germany
- *Modeling Dense Stellar Systems (MODEST-8)*, 5-8 December 2007, Bonn/Bad Honnef, Germany
- IAU Symposium No. 246 *Dynamical Evolution of Dense Stellar Systems*, 5-9 September 2007, Capri, Italy
- ESO workshop: *12 Questions on Star and Massive Star Cluster Formation*, 3-6 July 2007, Garching, Germany
- *Milky Way Halo Conference*, 29 May - 2 June 2007, Bonn, Germany
- *Structure formation in the Universe*, 27 May - 1 June, 2007, Chamonix, France
- *Galactic & Stellar Dynamics in the Era of High-Resolution Surveys*, 16-18 March 2007, Strasbourg, France
- *The Dynamics of Star Clusters and Star Cluster Systems*, 6-8 November 2006, Sheffield, UK
- IAU XXVI General Assembly Joint Discussion 14, *MODEST-7*, 17 - 23 August 2006, Prague, Czech Republic
- IAU Symposium No. 235 *Evolution of Galaxies across the Hubble Time*, 14-17 August 2006, Prague, Czech Republic
- IAU Symposium No. 237 *Triggered Star Formation in a turbulent ISM*, 14-18 August, 2006, Prague, Czech Republic
- *International School on Galactic and Cosmological N-Body Simulations*, 23 July - 5 August 2006, Tonantzintla, Puebla, Mexico.
- *Cambridge N-body School*, 30 July - 11 August 2006, Cambridge, UK
- *Mass Loss from Stars and the Evolution of Stellar Clusters Workshop*, 29 May - 1 June 2006, Lunteren, Netherlands

Commission 37 has endorsed three IAU Symposia to be held during the IAU XXVII General Assembly in Rio de Janeiro, Brazil, 3-14 August 2009:

- IAU Symposium No. 262 *Stellar Populations - Planning for the Next Decade*
- IAU Symposium No. 265 " *Chemical Abundances in the Universe - from Stars to Planets*
- IAU Symposium No. 266 " *Star Clusters: Basic Galactic Building Blocks throughout Time and Space*

An excellent review on the use of globular cluster systems as tracers of galaxy formation and assembly was given by J. P. Brodie & J. Strader (2006, *ARAA* 44, 193). One of the primary aims of the authors was "to emphasize the current and potential links with results from galaxy surveys at high redshift and interpretations from stellar population synthesis, numerical simulations, and semi-analytical modeling".

Additional reviews regarding a variety of aspects of star cluster research have also appeared in the proceedings of the conferences and meetings listed above.

4. Databases

Data on Open Clusters in the Milky Way and the Magellanic Clouds can be found in the WEBDA site <www.univie.ac.at/webda/>, which was originally developed by Jean-Claude Mermilliod from the Laboratory of Astrophysics of the EPFL (Switzerland)

and is now maintained and updated by Ernst Paunzen from the Institute of Astronomy of the University of Vienna, Austria.

Data on Galactic Globular Clusters can be found in the *Catalog of parameters for Milky Way globular clusters* by W. E. Harris (<www.physics.mcmaster.ca/Globular>), as well as in the *Galactic Globular Clusters Database* at the Astronomical Observatory of Rome (INAF-OAR: <venus.mporzio.astro.it/marco/gc/>).

A *Catalogue of Variable Stars in Globular Clusters* developed and maintained by Christine Clement can be found at <www.astro.utoronto.ca/cclement/>.

5. Discussion and closing remarks

Recent advances in instrumentation (wide-field imaging cameras and multiplexing spectrographs on several 8-10 meter class telescopes; enhanced sensitivity and spatial resolution both at short wavelengths - *Chandra* / *XMM* and *GALEX* - and in the mid and far infrared - *Spitzer Space Telescope* - in conjunction with advanced numerical and semi-analytic simulations and models are expected to bring up a revolution in our understanding of star clusters allowing us to follow their spatial, kinematic, chemical, and structural evolution both in the Milky Way and in external galaxies.

Despina Hatzidimitriou
president of the Commission