

Scientific report of the GREAT-ITN training school on “The art of observational campaigns”

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Summary

Within the framework of the GREAT Marie-Curie Initial Training Network (ITN), we have organized a training school at the IAC devoted to provide the students with a deep understanding of the conception, organisation, management and run of an observational project. This event was contemplated in training work plan of the proposal submitted to the 7th Framework Programme, which was successfully considered. 23 students attended the school. 12 of them were Early Stage Researchers (ESR) recruited by the GREAT-ITN, and the remaining 11, including 3 from the organizing institution, the Instituto de Astrofísica de Canarias (IAC), were closely related to the scientific topic of the Gaia mission.

The school took place during September 3rd to 7th in the city of La Laguna, where the IAC premises are located. The lectures were held in a centrally located hotel in La Laguna (Hotel Nivaria) during the morning sessions, and in the IAC headquarters, in the afternoons. All the attendees, students plus lecturers were lodged at the hotel of the event.

Being the main aim to give a detailed account of the many aspects on which a big scientific observation programme can be split, or how to convert a scientific problem into a feasible observational project, the school was organised in two main sections. During the mornings, the different topics were developed by the instructors in a series of lectures each of these focused in a specific area. The afternoons were devoted to practical exercises on which the students were asked to organise an observing programme starting from scratch. The results of these exercises along with a short summary of the student's PhD project have been presented during the Thursday afternoon session.

A web page hosted at the IAC web site was created to include all the information relevant to the school. The site is at <http://www.iac.es/congreso/itn-gaia/>, where the ESF logo is depicted in the main banner. The pdf of the lectures and the videos of the student final exercise can be viewed there. We are currently working to edit all the video material recorded during the lecture sessions, which will then be uploaded to the web page of the school.

During the first half of the night of Wednesday 5th, the student attended a supervised observing run at two telescopes of the Observatorio del Teide (Tenerife): the optical telescope, IAC80 (80 cm) and the infrared 1.5m TCS. The students were asked to prepare an observing plan for both telescopes during the Wednesday afternoon session, which was then executed under the supervision of several instructors. The raw data will also be linked to the school web page.

As a final activity, the last day of the school was entirely devoted to visit the Observatorio del Roque de los Muchachos, in the neighbouring island of La Palma, to where the students were transferred by plane, accompanied by two instructors. The observatory is the location of the largest optical and NIR telescope in the world, the 10.4m GTC. We paid detailed visit to the Isaac Newton Telescope (2.5m), the William Herschel (4.2m), the GTC (10.4m) and the twin 16m Cherenkov telescopes, MAGIC I and II.

Scientific Content

Gaia is the European Space Agency mission which will provide a stereoscopic census of our Galaxy through the measurement of high accuracy astrometry, radial velocities and multi-colour photometry. Gaia is scheduled for launch in August 2013 (TBC). It is designed to map over one billion stars over the

course of its five year mission, in practice every object in the sky brighter than magnitude 20, with three instruments to collect astrometric, photometric and spectroscopic data on stars in the Milky Way and in galaxies belonging to the Local Group, distant galaxies, quasars and solar system objects. Gaia builds on the expertise established in Europe through the successful ESA Hipparcos mission. It will achieve an astrometric accuracy of 10–25 μas , depending on colour, at 15th magnitude and 100–300 μas at 20th magnitude. Multi-colour photometry will be obtained for all objects by means of low-resolution spectrophotometry between 330 and 1000 nm. In addition radial velocities with a precision of 1–15 km/s will be measured for all objects to 17th magnitude, thus complementing the astrometry to provide full six-dimensional phase space information for the brighter sources.

GREAT is a pan European science driven research infrastructure which will facilitate, through focused interaction on a European scale, the fullest exploitation of the ESA Gaia 'cornerstone' astronomy mission, enabling the European astronomy community to provide answers to the key challenges in our understanding of the Galaxy and Universe.

GREAT is the programme which will bring together relevant scientific expertise by promoting topical workshops, training events, exchange visits, conferences and so forth with the aim of addressing the major scientific issues that the Gaia satellite will impact upon. GREAT provides support through its European Science Foundation Research Networking Programme for a wide range of community proposed events covering the key objective areas of the programme, largely focussed on gaining a deeper understanding of our Milky Way.

The GREAT ITN is a Marie-Curie Initial Training Network (ITN) which aims at preparing a generation of young researchers for the scientific exploitation of the Gaia catalogue data. The GREAT-ITN project will shape a critical mass of new expertise with the fundamental skills required to power the scientific exploitation of Gaia over the coming decade and beyond. The GREAT-ITN research theme is 'Unravelling the Milky Way' focused on four fundamental problems: unravelling the origin and history of our home galaxy; tracing the birth place and understanding the astrophysical properties of the stellar constituents of our galaxy; deepening the understanding of planetary systems by linking the study of exoplanets to the origins of the solar system; take up the grand challenges offered by Gaia in the domains of the distance scale and the transient sky.

The GREAT-ITN will deliver a training programme structured around these research themes to a core of new researchers, equipping them with the skills and expertise to become future leaders in astronomy or enter industry. These skills are relevant across many of the key challenges facing us now from climate change to energy security. These require well-trained people, people which this GREAT-ITN will deliver.

It is as part of the training programme of GREAT-ITN that we have organized a school in Tenerife (Canary Island, Spain) devoted to provide the students with a deep understanding of the conception, organisation, management and run of an observational project. The Canary Islands hosts the European Northern Observatory (ENO) composed by two major observatories located in the islands of Tenerife (OT) and La Palma (ORM), this latter being the site of the largest optical-infrared telescope in the world, the GTC. Both observatories are managed by the Instituto de Astrofísica de Canarias (IAC).

The school's main aim is to provide the students with a background in the many details associated with a large observational project, like Gaia or the on going Gaia-ESO Survey (GES), which has been used as a template along the school, in particular during the exercises at the afternoon sessions.

Assessment of the results

There was a consensus among the participants at the school, both students and speakers, on the success of the event. The objectives of this meeting, outlined in the previous sections, were covered to a large extent.

The speakers built their lectures bearing in mind the astrophysical background of the audience and the purposes of the school. This was a primary objective of the selection of both topics and lecturers during the organisation and was emphasized by the organisers. The small numbers of attendees made it possible to maintain a close contact between the senior and young groups and monitor the run of the event among the latter ones.

This close link established with the students was reinforced during the two working visits to the observatories where ample time was devoted to the interactions among the whole group. The structure of the afternoon sessions, with the students organised in small groups, also facilitated the contacts with them.

In short, we feel that the school has contributed to the skills of the students in many aspects related to the organisation and run of large observational projects

Annex I: Programme of the meeting

Monday 3

08.45-09.00	Welcome to the school	Paco Garzón
09.00-11.00	The Gaia mission	Nick Walton
11.30-13.30	GES: description, status and prospects	Carlos Allende
15.00-18.00	Introduction to practical sessions: description and distribution of exercises	Peter Hammersley / Paco Garzón + instructor team

Tuesday 4

09.00-11.00	Observation management and logistics. Types of obs. progs.	Fernando Comerón
11.30-13.30	Gaia data flow: data treatment and reduction	Xavier Luri
15.00-18.00	Working @ IAC	Instructor team
20.00-24.00	School dinner	

Wednesday 5

09.00-11.00	Pre-observations and models	Carine Babusieaux
11.30-13.30	The Virtual Observatory	Enrique Solano
15.00-17.00	Working @ IAC (VO oriented)	Instructor team
17.00-01.00	Observing run @ OT: IAC80 + TCS: CMD of selected clusters (visible + NIR)	Instructor team

Thursday 6

10.00:11-30	ESO observatories: description and how to optimize obs. to fit on it	Peter Hammersley
12.00-13.30	ORM telescopes: same as above	Rene Rutten

15.00-18.00 Presentations of student's work

Friday 7

08.00-20.00 Visit to ORM

Annex II: full list of speakers and participants

Lecturers

Carlos	Allende	IAC
Carine	Babusieux	GEPI - Observatoire de Paris
Antonio	Cabrera	GRANTECAN-IAC
Fernando	Comerón	ESO
Francisco	Garzón	IAC
Peter	Hammersley	ESO
Xavier	Luri	Ubarcelona
Enrique	Solano	LAEFF-CAB
Nic	Walton	IoA, Cambridge

Students

Mohamad	Abbas	Max-Planck Institute for Astronomy
Hoda	Abedi	University of Barcelona
Nadejda	Blagoródnova	Institute of Astronomy
Sergi	Blanco Cuaresma	Laboratoire d'Astrophysique de Bordeaux
Tristan	Cantat-Gaudin	OAPd-INAF
Paul	Compère	Instituto de Astrofísica de Canarias
Miriam	Cortés Contreras	Facultad de Ciencias Físicas, Complutense
Sarah	Fazlollahpour	IPM - Tehran
Fabo	Feng	Max-Planck Institute for Astronomy

Guillaume	Guiglion	Université de Nice Sophia-Antipolis
Nataliya	Kovalenko	Kyiv National University
Cheng	Liu	Lund Observatory
Terry	Mahoney	Instituto de Astrofísica de Canarias
Carmen Adriana	Martinez Barbosa	Leiden University
Tatiana	Muraveva	INAF - Astronomical Observatory of Bologna
Pieter	Neyskens	IAA, Université Libre Bruxelles
Max	Palmer	University of Barcelona
Sara	RezaeiKhoshbakht	Islamic Azad University, Tehran Central Branch
Maryam	Saberi	Alzahra University
Toni	Santana i Ros	Uniwersytet Im. Adama Mickiewicza, Poznan
Iulia	Simion	Institute of Astronomy, UCAM
John	Vickers	Astronomisches Rechen-Institut
Javier	Zaragoza	Instituto de Astrofísica de Canarias