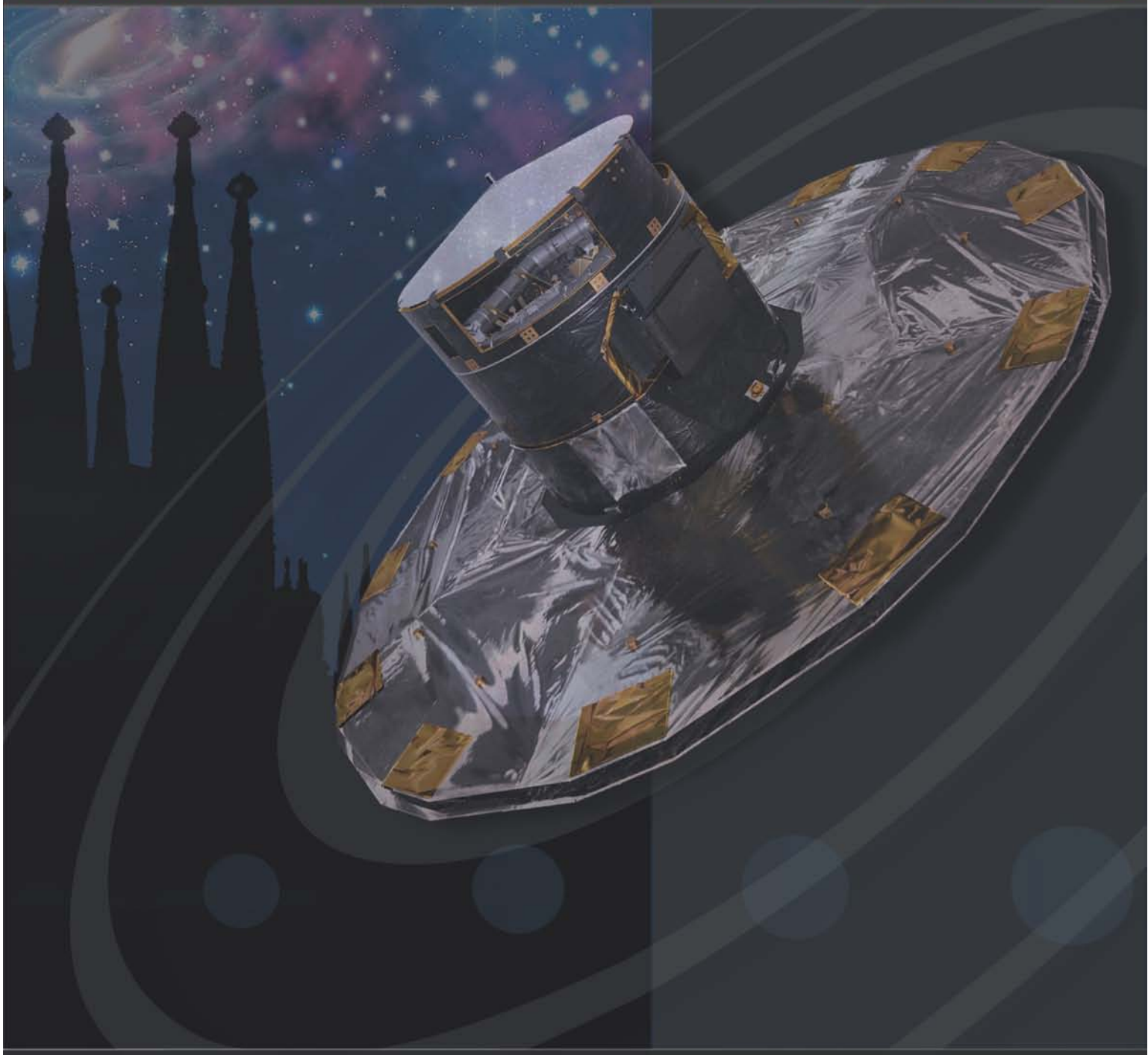
The Milky Way Unraveled by Gaia

GREAT Science from the Gaia Data Releases



1-5 December 2014

Aula Magna, University of Barcelona

Barcelona, Spain

http://gaia.ub.edu/greatconf14

GREAT-ITN MARIE CURIE ACTIONS http://www.great-itn.eu

GOBIERNO DE ESPAÑA · MINISTERIO DE ECONOMÍA Y COMPETITIVIDAD · FECYT FUNDACIÓN ESPAÑOLA PARA LA CIENCIA Y LA TECNOLOGÍA

THE MILKY WAY UNRAVELLED BY GAIA

- GREAT Science from the Gaia Data Releases -

Scientific Rationale

The Gaia Research for European Astronomy Training (GREAT) network is a pan European science driven research infrastructure, which is facilitating, through focused interaction on a European scale, the fullest exploitation of the ESA Gaia 'cornerstone' astronomy mission. After the successful launch of the Gaia satellite (19 December 2013) and the recent completion of its complex commissioning phase, Gaia commenced its five-year nominal mission in summer 2014. The astronomy community will soon be able to use the rich datasets from Gaia in generating profound advances in the study of the Cosmos.

The GREAT ITN (Initial Training Network – see http://www.great-itn.eu) is supported by the EC through its FP7 Marie Curie programme, and is devoted to the training of the next generation of 'Gaia' scientists, through their participation in a range of key Gaia research programmes at research centres across Europe.

The GREAT-ITN final conference will be held 1-5 December 2014. This open conference will provide the opportunity for the highlights of the research activities carried out during last years to be presented. These topics range from the structure and formation of the Milky Way as a whole, to the study of asteroids in our own Solar System. The conference will also include a range of topical presentations concerning the status of Gaia, and new results from the earliest mission data (the 'Gaia photometric alerts'). In addition the conference will cover topics such as science resulting from a range of ground-based surveys aiming to leverage Gaia, e.g. new insights from the large Gaia-ESO survey, together with presentations from other initiatives in the USA, China, and elsewhere.

Researchers active in any topic, already involved with the GREAT network, or with interests in Gaia and the science it will enable, are welcome to join the conference in December, and are encouraged to contribute to the meeting via either contributed talks or posters.

We look forward to welcoming you to Barcelona, for what promises to be the first of many conferences benefitting from the wealth of Gaia data.

Nicholas Walton and Francesca Figueras (on behalf of the SOC).

THE MILKY WAY UNRAVELLED BY GAIA

- GREAT Science from the Gaia Data Releases -

WIFI connections

wifi.ub.edu

User: agjped.tmp

Password: rtzp77

There is also **eduroam** available.

Public Outreach

Gaia Exposition: *Mil millions d'ulls per a mil millions d'estrelles* (in Catalan)

The exhibition is at the "Cloister of Sciences" on the ground floor of the historical building.

Guided tours for secondary schools and general public

Tuesday 2 Dec. 13:00 – 14:00; 18:00 – 19:30

Thursday 4 Dec: 13·:00 – 14:00

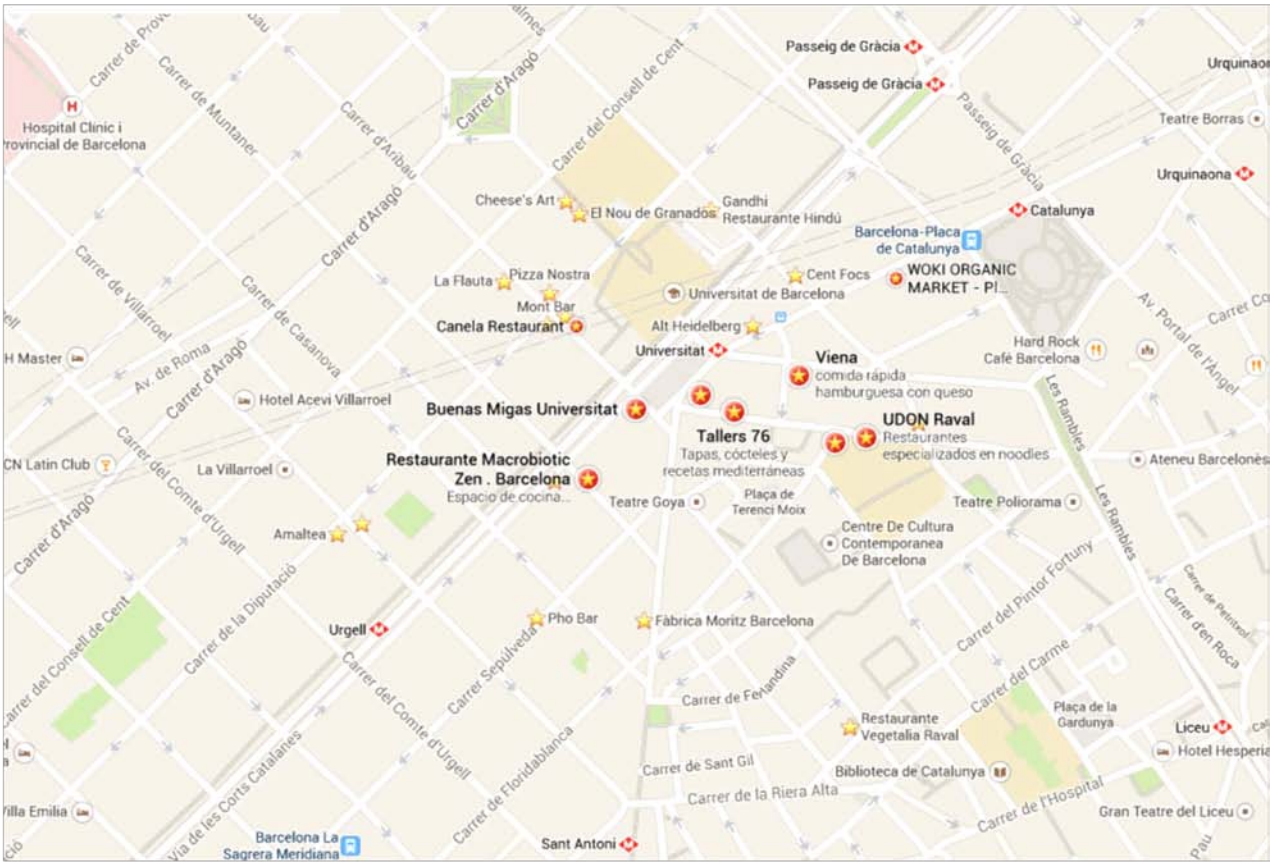
Public Conference *Gaia i l'odissea galàctic* (in Catalan)

Tuesday 2 Dec: 19:30 at the Paranimf

More information on the webpage of the conference.

PRACTICAL INFORMATION

Barcelona, Spain



Marked in the map there are some restaurants but many more in Aribau st and in the neighbourhood.

Cent Focs

3,6 57 reseñas · Restaurante

Cálido local con luces indirectas, espejos redondos clásicos y una carta mediterránea con menús variados. - Google

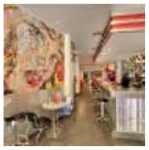
Carrer de Balmes, 16, 08007 Barcelona 934 12 00 95

BIG J's BURGER

4,2 39 reseñas · Restaurante americano

Hamburguesas al gusto, cócteles y postres caseros en un colorido diner que evoca la América de los años 60. - Google

Carrer d'Aribau, 18, 08011 Barcelona 933 01 54 54

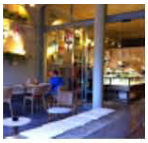


Buenas Migas Universitat

3,7 25 reseñas · Restaurante italiano

La gente habla sobre: **focaccias**

Plaça de la Universitat, 1, 08007 Barcelona 933 56 23 56



WOKI ORGANIC MARKET - Pl. CATALUNYA

4,3 28 reseñas · Supermercado

Ronda de la Universitat, 20, 08007 Barcelona 933 02 52 06

Celler de Tapas

3,2 19 reseñas

La gente habla sobre: **patatas bravas · huevos de codorniz · pan con tomate · el pollo · croquetas**

Plaça de la Universitat, 5, 08007 Barcelona 933 17 64 88

Tallers 76

3 reseñas · Restaurante

Moderno café-bar con terraza que sirve tapas, bocadillos, copas y cocina mediterránea, a la carta o en menú. - Google

Carrer dels Tallers, 76, 08001 Barcelona 936 67 49 00

Viena

3,8 73 reseñas · Restaurante

La gente habla sobre: **comida rápida · hamburguesa con queso · queso fundido · calle pelayo · patatas fritas**

Carrer de Pelai, 16, 08001 Barcelona 933 17 06 00

Canela Restaurant

2,9 42 reseñas · Restaurante

Un barco de madera y una cita literaria decoran este local de cocina mediterránea, con respaldos acolchados. - Google

C/ Aribau, 16, 08011 Barcelona 933 17 79 47

Restaurante Macrobiotic Zen . Barcelona

4,6 14 reseñas · Restaurante macrobiótico

Platos vegetarianos y macrobióticos en un acogedor local, decorado con un reloj retro, que dispone de tienda. - Google

Carrer de Muntaner, 12, 08011 Barcelona 934 54 60 23

La Flauta

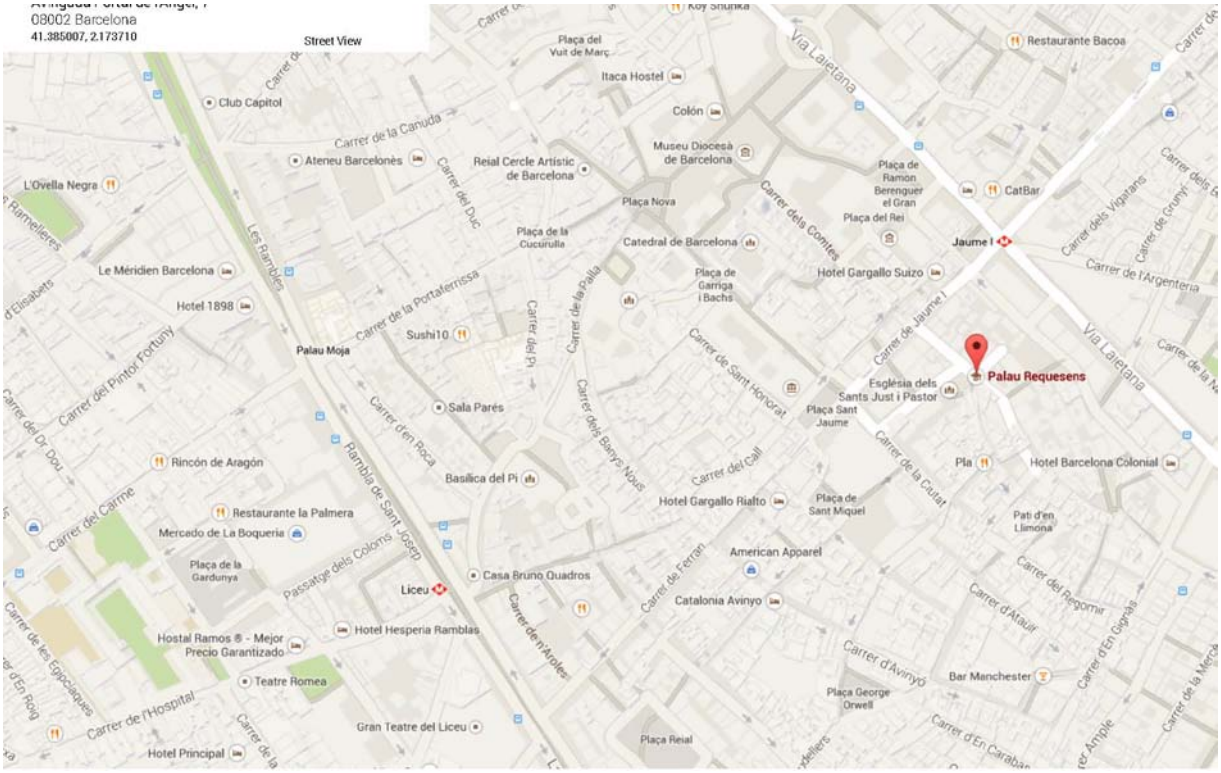
4,5 126 reseñas · Restaurante

La gente habla sobre: **las patatas bravas · cola · buena comida · aceptan reservas · jamón ibérico**

Calle D´aribau, 23, 08011 Barcelona 933 23 70 38

Social Diner

Palau Requesens, C. Bisbe Cassador, 3. 19:45 Glass of cava welcome



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Zhong, Jing	Shanghai Astronomical Observatory

PROGRAMME

Monday 1st December 2014

12.30 - 14.00	Registration

14.00 - 15.30	**Session 1 The GREAT ITN and Gaia: Context and Status**
14.00 - 14.10	Welcome Nicholas Walton Francesca Figueras
14.10 - 14.30	**GREAT-ITN and Gaia: Preparing for Science** Nicholas Walton
14.30 - 15.00	**Gaia Mission Status** Timo Prusti
15.00 - 15.30	**Gaia Science Performance** Jos de Bruijne
15.30 -16.00	*Coffee break and poster viewing*
16.00 -18.00	**Session 2 The Physics and Science Promise of Gaia**
16.00 -16.30	**Formation and evolution of the Galactic disks** Misha Haywood
16.30 -17.00	**Tick, tock, tick, tock ...** Wyn Evans
17.00 -17.30	**Gaia Astrometry and Fundamental Physics** Sergei Klioner
17.30 -17.45	**Gaia Validation Tasks** Claus Fabricius
17.45 -18.00	**From telemetry to science** Jordi Portell

Tuesday 2nd December 2014

09.00 -10.30	**Session 2 (cont) The Physics and Science Promise of Gaia**
09.00 - 09.15	**Measuring the Gaia basic angle variations: the BAM on-board laser interferometer** Alcione Mora
09.15 - 09.30	**Gaia Radial Velocity Spectrograph Performance** Mark Cropper
09.30 - 09.45	**The variability Analysis and Processing of Gaia data** Laurent Eyer
09.45 -10.00	**Making action-angle disc models for Gaia** Paul McMillan
10.00 -10.15	**A PRIMAL view of the Milky Way, made possible by Gaia and M2M modelling** Jason Hunt
10.15 -10.30	**Analysing the disc Red Clump stars of the Galactic bar in the Gaia space of observables** Mercè Romero-Gómez
10.30 -11.00	*Coffee break and poster viewing*
11.00 -13.15	**Session 3 Planetary Systems: Worlds Near and Far**
11.00 -11.30	**The Gaia mission in the rapidly-evolving context of exoplanet science** Ignasi Ribas
11.30 -12.00	**Exoplanets with Gaia: Synergies in the Making** Alessandro Sozzetti
12.00 -12.30	**Planet formation with Gaia** Anders Johansen
12.30 -12.45	**Exoplanets: Gaia and the importance of ground based spectroscopy follow-up** Lisa Benamati
12.45 -13.00	**Stars with and without planets: Where do they come from?** Vardan Adibekyan
13.00 -13.15	**Physical models of asteroids from photometric surveys: preparation of Gaia data exploitation** Toni Santana i Ros
13.15-14.45	*Lunch break*

14.45 -16.15 **Session QA1 Gaia Science - Extended Q+A session**

14.45 -15.30 **Understanding the formation of the Milky Way in the era of Gaia**
Ivan Minchev

15.30 -16.15 **What drives the evolution of the Milky Way's disk?**
Jo Bovy

16.15 -16.45 Coffee break and poster viewing

Session 4 The Stellar Constituents of the Milky Way

16.45 -18.15 **Session 4A Star Cluster Evolution**

16.45 -17.15 **The open clusters in the Gaia ESO Survey**
Laura Magrini

17.15 -17.30 **The history of the Birth cluster of the Sun**
Carmen A. Martinez-Barbosa

17.30 -17.45 **Quest for finding the lost siblings of the Sun**
Cheng Liu

17.45 -18.00 **Testing the chemical tagging technique with Open Clusters**
Sergi Blanco-Cuaresma

18.00 -18.15 **Stellar relics from the cosmic dawn in the Milky Way bulge**
Martin Asplund

Wednesday 3rd December 2014

09.00 -11.00 **Session QA2 Gaia Science - Extended Q+A session**

09.00 - 09.45 **Scientific synergies of Gaia with ground based spectroscopic surveys**
Alejandra Recio-Blanco

09.45 -10.30 **Exploring Milky Way structure and dynamics**
Ralph Schöenrich

10.30 -11.00 **PhD focus: discussion session**
Alejandra Sans & Sergi Blanco.Cuaresma

11.00 -11.30 *Coffee break and poster viewing*

11.30 -13.00 **Session 4B Stellar Astrophysics**

11.30 -12.00 **Synergy between asteroseismology and the Gaia mission**
Josefina Montalban

12.00 -12.15 **Highlights of the LINEAR survey**
Lovro Palaversa

12.15 -12.30	**Detecting the Milky Way Halo Structure and Sub-Structure with OPTICS** Alejandra Sans
12.30 -12.45	**Stellar distribution in the star-forming region Gamma Velorum** Tristan Cantat-Gaudin
12.45 -13.00	**The open clusters in the Gais ESO Surveys and beyond** Antonella Vallenari
13.00 -13.15	**Galactocentric variation of the abundance structure in the Milky Way stellar disk - results from the Gaia-ESO survey** Sofia Feltzing
13.15 -14.45	Lunch break
14.45 -18.00	Social programme
19.45	Social diner

Thursday 4th December 2014

09.00 - 13:00	**Session 5 The Origin and History of the Milky Way**
09.00 - 09.30	**RAVE as a Gaia precursor, what to expect from the Gaia RVS?** Matthias Steinmetz
09.30 -11.00	**Session 5A Archaeology of the Milky Way**
09.30 -10.00	**New observational constraints to chemodynamical models of the Milky Way** Cristina Chiappini
10.00 -10.15	**Large-scale structure of the inner Milky Way** Iulia Simion
10.15 -10.30	**Blue Horizontal Branch Stars in Pan-STARRS. The Galactic Halo.** John Vickers
10.30 -10.45	**Substructure in galaxy discs: Identifying secularly evolved populations** Matthew Molloy
10.45 -11.00	**Statistical analysis of large scale surveys for constraining the Galaxy evolution** Andre Martins
11:00 -11:30	Coffee break and poster viewing

11.30 -13.00	**Session 5B Galactic Structure and Evolution**
11.30 - 12.00	**Hunting for debris in the disk** Justin Read
12.00 -12.15	**Assessing the impact of astronomical phenomena on the Earth** Fabo Feng
12.15 -12.30	**Constraints on thin and thick disc formation from new analysis of 2MASS and SDSS surveys** Annie Robin
12.30 -12.45	**Orbit of the Ophiuchus Stream** Branimir Sesar
12.45 -13.00	**The Perseus arm stellar overdensity at 1.6 kpc** Maria Monguió
13.00-14.30	*Lunch break*
14.30 -16.15	**Session 5C Gaia, Galactic Surveys, Modelling, Synergies**
14.30 -15.00	**Dynamical models of the Galactic Disk** Hans-Walter Rix
15.00 -15.30	**From SDSS to Gaia and LSST** Zeljko Ivezic
15.30 -16.00	**The Galactic Archaeology with HERMES (GALAH) Survey** Joss Bland-Hawthorn
16.00 -16.15	**Radial velocities and chemical tagging with WEAVE at the WHT** Marc Balcells
16.15 -16.45	*Coffee breaks and poster viewing*
16.45 -18.30	**Session 5D Galactic Dynamics**
16.45 -17.15	**A multi-scale approach to simulate the Galaxy** Luis Aguilar
17.15 -17.30	**On the characterization of the Galactic warp in the Gaia era** Hoda Abedi
17.30 -17.45	**What can Gaia proper motions tell us about Milky Way dwarf galaxies?** Shoko Jin
17.45 -18.00	**Stellar motion around co-rotating spiral arm: Gaia Mock data** Daisuke Kawata
18.00 -18.15	**Hypervelocity stars in the Gaia era** Elena Rossi

18.15 -18.30	**Cool runaways - Nearby Hills ejecta as a probe of the gravitational potential of the Milky Way** Martin Smith

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Friday 5th December 2014

09.00 -11.00	**Session 6 Grand Challenges from Gaia**
09.00 -10.30	**Session 6A The Distance Scale**
09.00 - 09.30	**Gaia, Variable Stars and the Distance Scale** Patricia Whitelock
09.30 - 09.45	**Astrostatistics for luminosity calibration in the Gaia era** Max Palmer
09.45 -10.00	**Improving the cosmic distance ladder: distance and structure of the Large Magellanic Cloud** Tatiana Muraveva
10.00 -10.15	**Infrared survey of variable stars toward the bulge and beyond** Noriyuki Matsunaga
10.15 -10.30	**Three-dimensional extinction mapping using Gaussian random fields** Stuart Sale
10.30 -11.00	*Coffee break and poster viewing*
11.00 -12.30	**Session 6B The Transient Sky**
11.00 -11.30	**Supernovae** Rubina Kotak
11.30 -11.45	**Gaia: switching on the transient discovery machine** Nadejda Blagoródnova
11.45 -12.00	**Ground based follow-up for Gaia Science Alerts: First Results** Morgan Fraser
12.00 -12.15	**Eclipsing binaries in the Gaia era: automated detection performance** Berry Holl
12.15 -13.15	**Session 7 Beyond Gaia, Beyond GREAT**
12.15 -12.45	**Space astrometry in the Gaia era** Anthony Brown
12.45 -13.05	**GREAT2Net - Networking in the Era of Gaia** Nicholas Walton
13.05 - 13.15	**Closing Words and Final Discussion** Timo Prusti
13.15 -14.30	Conference Close


The Milky Way Unraveled by Gaia
GREAT Science from the Gaia Data Releases

TALKS

SESSION 1

THE GREAT ITN AND GAIA: CONTEXT AND STATUS

Great-ITN and Gaia: Preparing for Science

Nicholas Walton IoA, Univ. Cambridge, Uk 01/12 14:10h

I will review the progress of the GREAT Initial Traning Network (http://www.great-itn.eu). The network started in Mar 2011 and will complete Feb 2015. During this period seventeen early stage researchers, located across thirteen institutes (mainly) in Europe, have been involved in a range of science projects directly related to the science of Gaia. Their work has directly supported the scientific preparation of Gaia. This presentation will mention a number of areas of impact, and note how the network has enabled a range of scientific collaborations across the wider community of scientists and engineers involved in the construction and now operations of Gaia.

Gaia Mission Status

Timo Prusti ESTEC, ESA, The Netherlands 01/12 14:30h

Gaia is in routine phase since July 2014. The spacecraft is observing the sky guided by so called nominal scanning law. This is to cover the sky in optimal way for the astrometric measurements. The initial conditions of the scanning law have been determined to optimise a light bending experiment with a bright star close to the limb of Jupiter in 2017. The magnitude limits of Gaia has been pushed both at the bright and faint end for astrometry and photometry while work is ongoing to determine precisely the limiting magnitude for the Radial Velocity Spectrometer. The current status of Gaia will be outlined along with the plans for the near future.

Gaia Science Performance

Jos de Bruijne ESTEC, ESA, The Netherlands 01/12 15h

ESA's Gaia mission has started its nominal science mission in July 2014. This presentation provides an overview of the post-commissioning science performance predictions.

SESSION 2

THE PHYSICS AND SCIENCE PROMISE OF GAIA

Formation and evolution of the Galactic disks

Misha Haywood Observatoire de Paris, France 01/12 16h

Recent observational constraints and modeling efforts have provided a wealth of new information on the Galactic disks, suggesting new paths in our understanding of their formation and evolution. The thick disk formed over several Gyr during a starburst phase and is representing a substantial fraction of the Milky Way stellar mass. The thin disk is well differentiated in an inner and an outer component. I will review this new picture and discuss how Gaia should help us to revise our views of Galactic stellar populations.

Tick, tock, tick, tock ...

Wyn Evans IoA, Univ. Cambridge, UK 01/12 16:30h

Stay Calm. Gaia Zero Hour is almost Here. The first data releases will be with us in 2016. This talk discusses applications in the local Solar Neighbourhood, the Galactic disk with its stellar warp and flare, and the Galactic bulge, with emphasis on the likely scientific yield from the early data releases.

Gaia Astrometry and Fundamental Physics

Sergei Klioner Lohrmann Observatory, Germany 01/12 17h

Unprecedented astrometric accuracy of Gaia gives a unique opportunity to perform a suite of tests of fundamental physics. The tests range from a test of the Local Lorenz Invariance and the gravitational detection of light to measuring the mass of black hole candidates in certain compact binary systems with visible components. Gaia data can also be used to estimate the energy flux of the gravitational waves in certain frequency ranges. The envisaged tests will be critically reviewed and put into context with the planned Gaia data releases.

Gaia Validation Tasks

Claus Fabricius ICC-UB / IEEC, Spain 01/12 17:30h

Before Gaia data are published, they will undergo scrutiny in several different validation processes. Each leg of the data reduction (astrometry, photometry, spectroscopy, double stars, Solar system, variability, classification) will have its own specialised validation with focus on the difficult points for that task. In addition, when the combined catalogue is ready for release, it will undergo an independent, more global, validation. All kinds of properties of the catalogue are checked, and it is of particular interest to test if the error estimates are realistic, and if the parameters are unbiased. We also look briefly at the experiences from other projects like 2MASS and Hipparcos, and address recent worries expressed in the journal "nature", alleging that Hipparcos was wrong and that Gaia will therefore also be wrong.

From telemetry to science

Jordi Portell, Claus Fabricius, Nora Garralda, Juanjo González, Jordi Torra, Javier Castañeda
ICC-UB/IEEC, Spain 01/12 17:45h

The on-board payload data handling system of Gaia generates a huge amount of data with complex relations between them. All this has to be processed in a timely order once received on ground. The daily data processing systems must be efficient and robust, making sure that no data is lost. Exhaustive diagnostics must be carried out on the complete set of outputs generated to make sure that both on-board and on-ground systems behave as expected. Beyond the daily data processing, an even more complex set of systems arise, which must be adequately coordinated in order to reach the final goal of Gaia. In this talk we will describe the overall on-ground data processing systems for Gaia, focusing on the main scientific outcome provided at different stages.

Measuring the Gaia basic angle variations: the BAM on-board laser interferometer

Alcione Mora ESAC, Spain 02/12 9h

One key factor driving the ultimate accuracy of the Gaia catalogue is the knowledge of the basic angle. High frequency changes, on periods shorter than a revolution, can introduce systematic errors very difficult or impossible to remove. Variations of the basic angle up to the level of a milliarcsecond were identified during early commissioning. Extensive investigations on the root cause are still on-going.

The on-board Basic Angle Monitor (BAM) is in charge of measuring such variations. It is the highest precision laser interferometer ever built, achieving 0.5 microarcsec each 15 minutes, equivalent to picometer shifts in the optical path or micro-fringe displacements of the interference pattern. The data analysis is challenging, and novel in many aspects. In particular, calibrating the signal better than 1/1000 is required to achieve the required Gaia accuracy.In this talk, the consolidated understanding of the basic angle variations, the data analysis strategies and the implications for future astrometric missions will be presented.

Gaia Radial Velocity Spectrograph Performance

Mark Cropper MSSL-UCL, UK 02/12 9:15h

The RVS performance post-commissioning will be reviewed. The RVS is operating well, with the major development being the higher levels of scattered light than anticipated: this has a significant impact on the faint object performance, reducing the limiting magnitude by approximately 1.3 magnitudes. Other concerns before launch, particularly the bias non-uniformity, appear to be stable, and reasonably well corrected. Measures have been taken to recover some of the RVS performance by using High Resolution mode only, and by minimising the window width dependent on the across scan motion. The current status of these measures will be described and the likely gains quantified.

The variability Analysis and Processing of Gaia data

Laurent Eyer UNIGE, Switzerland 02/12 9:30h

The variability analysis, that is foreseen for the Gaia mission, will be presented. The major steps of this processing are variability detection, characterisation, classification and specific object studies. Some examples will be given on simulations as well as on real (non-Gaia) data.

Making action-angle disc models for Gaia

Paul McMillan ASTRO, Lund Observatory, Sweden 02/12 9:45h

I'll discuss the recent history of creating action-angle models of the Milky Way to compare to Gaia data. These dynamical models are a vital method for determining the gravitational potential of the Milky Way. Over the period of the GREAT programme we've gone from the first disc df being written down (Binney 2010) to using these methods for constraining the potential from other surveys (Bovy & Rix 2013, Piffl et al 2014). We've also made huge steps that made action-angle coordinates easier to use.

A PRIMAL view of the Milky Way, made possible by Gaia and M2M modelling

Jason Hunt & Daisuke Kawata MSSL/UCL, UK 02/12 10h

We have developed our PaRtIcle-by-particle Made-to-measure (M2M) ALgorithm, PRIMAL, with the aim of modelling the Galactic disc from upcoming Gaia data. We have created mock Gaia data taking into account stellar populations, extinction and the expected Gaia errors, created from a Milky way like N-body disc galaxy simulation. In PRIMAL, observables calculated from these mock stars are compared with those of the N-body model, at the position of the target stars. Using our M2M algorithm, the masses of the N-body model particles are changed to reproduce the observables of the target mock data, and the gravitational potential is automatically adjusted by the changing mass of the model particles. We have applied PRIMAL to this mock Gaia catalogue and we show that PRIMAL can recover the structure and kinematics of a Milky Way like barred spiral disc, along with the apparent bar structure and pattern speed of the bar despite the galactic extinction and the observational errors.

Analysing the disc Red Clump stars of the Galactic bar in the Gaia space observables

M. Romero-Gomez, F.Figueras, T.Antoja, H.Abedi, L.Aguilar ICC-UB, IEEC, Spain 02/12 10:15h

We use a 3D test particle simulation evolved under a potential that includes a Galactic bar. The test particles are given the properties of the disc Red Clump stars in order to convolve with the Gaia errors and to generate a mock catalogue with the stars up to Gaia magnitude, G, 20.
In this work, we work in the space of Gaia observables, that is, trigonometric parallaxes. Thus, we show first how the bar structure is mapped in the parallax cartesian space derived from (parallax, galactic longitude).Secondly, we show the effect of the magnitude cut and the introduction o the Gaia errors. Finally, we also consider other possible error sources, for instance from IR photometric distances.

SESSION 3

PLANETARY SYSTEMS: WORLDS NEAR AND FAR

The Gaia mission in the rapidly-evolving context of exoplanet science

Ignasi Ribas ICE-IEEC, Spain 02/12 11h

In less than two decades from the publication of the discovery of 51 Peg b, exoplanet science has experienced a true revolution. Today, we know nearly 2000 confirmed exoplanets and, for some of them, we have managed to observe the spectroscopic signatures of their atmospheric constituents. Even in the relatively small parameter space that we have investigated thus far, Nature has revealed an unsuspected variety of planetary systems, indicating that the Solar System is another paradigm. And exoplanet science continues to teem with new ground-based planet search projects and dedicated space missions. Gaia certainly has its say in the exoplanet context and will certainly leave a legacy in this lively and rapidly-evolving field. Gaia will contribute to the search and discovery of transiting planets but, most importantly, it will expand the explored parameter space by uncovering a population of cool gas giants, which still have poor detection statistics and remain little studied. In this talk I will review the current status of exoplanet research, in terms of the most relevant results, surveys and facilities, and I will discuss the expected contribution of the Gaia mission to the field.

Exoplanets with Gaia: Synergies in the Making

Alessandro Sozzetti INAF-Torino, Italy 02/12 11:30h

The era of high-precision global astrometry has finally dawned upon us. I will illustrate the potential of Gaia micro-arcsec level precision in positional measurements to crucially contribute to several important issues in exoplanetary science. I will pay particular attention to its promise for improved global characterization of planetary systems around stars of all types, ages, and chemical composition when synergistically combined with other indirect and direct detection and characterization techniques.

Planet formation with Gaia

Anders Johansen Lund University, Sweden 02/12 12h

An important goal of planet formation research is to understand the architectures of planetary systems. What is the diversity of planetary systems and how common is our own solar system? I will present the current state of planet formation research and put particular emphasis on the contribution of the Gaia satellite to understanding the origin and diversity of planetary systems.

Exoplanets: Gaia and the importance of spectroscopy follow-up

Lisa Benamati IA, University of Porto, Portugal 02/12 12:30h

Thanks to Gaia, we will collect high-accuracy astrometric orbits of thounsands of new celestial objects, such as extra-solar planets and brown dwarfs.
These measurements in combination with spectroscopy and with present day and future extrasolar planet search programs will give a crucially contribution to several aspects of planetary systems astrophysics (formation theories, dynamical evolution, etc.). During my talk, I will give an overview of the importance of this synergy. Moreover, I will present the recent results about meta- tallicity-giant planet correlation for giant stars with the prospect of the importance of the new data coming from Gaia.

Stars with and without planets: Where do they come from?

V. Zh. Adibekyan, J. I. González Hernández, E. Delgado Mena, S. G. Sousa, N. C. Santos, G. Israelian, P. Figueira
CAUP, Porto, Portugal 02/12 12:45h

Several studies have suggested that the correlation between chemical abundance and condensation temperature, Tc, is a signature of terrestrial planet formation. In particular, Melendez et al. (2009) claimed that the Sun shows "peculiar" chemical abundances because of the presence of the terrestrial planets in our solar-system. Very recently, we have questioned this interpretation, by showing that the Tc correlation may be simply connected to the origin in the Galaxy and population of the stars. We found that the Tc slope significantly correlates with the stellar age and with the mean galactocentric distance of the stars, suggesting that old stars and stars originated in the inner Galaxy have less refractory elements relative to the volatiles.

Physical models of asteroids from photometric surveys: preparation of Gaia data exploitation

T. Santana-Ros, P. Bartczak, T. Michałowski, P. Tanga & A. Cellino
AMU, Poznam, Poland 02/12 13h

It is estimated that the ESA Gaia mission will produce photometric measurements for more than 300,000 asteroids. The inversion technique specifically developed to invert this huge set of sparse data is based on a genetic algorithm. Its formal solution is characterized by the best fit of a set of parameters that have been obtained by means of several random mutations. Now that all the parameters of the Gaia scanning law are fixed, we are able to predict the observation sequence for solar-system objects. This means that we can plan to observe from the ground at the same time as Gaia. The link between the two data sets would then be very strong, as a single Gaia measurement provides a very precise absolute magnitude that can be used to calibrate the ground-based light curve. The question is: how many such light curves do we need to obtain a substantial improvement of the inversion? Our work is thought to address such questions and lay the foundations for a collaboration involving coordinated observations from the ground. Moreover, we focus on assessing the reliability of the solutions derived with the Gaia inversion algorithm as a function of the asteroids' physical parameters.

SESSION QA1

GAIA SCIENCE – EXTENDED Q+A SESSION

Understanding the formation of the Milky Way in the era of Gaia

Ivan Minchev Leibniz-AIP, Germany 02/12 14:45h

The main goal of Galactic Archaeology is to understand the formation and evolution of the basic Galactic components, e.g, bulge, thin and thick disks, and halo. This requires sophisticated chemo-dynamical modeling, where disk asymmetries (e.g., perturbations from the bar, spirals, and mergers) and non-equilibrium processes are taken into account self-consistently. I will discuss today's status of Galactic chemo-dynamical modeling and will present a new technique, which helps circumvent traditional problems with chemical enrichment and star formation encountered in fully self-consistent cosmological simulations. I will discuss chemo-kinematic relations in the Milky Way, which can be used to recover the assembly history of the Galaxy. These will soon be tested by the extremely precise Gaia data, complemented by its spectroscopic follow-up surveys (e.g., WEAVE and 4MOST).

What drives the evolution of the Milky Way’s disk?

Jo Bovy Institute for Advanced Studies, USA 02/12 15:30h

Observations of the structure and dynamics of different stellar populations in the Milky Way's disk provide a unique perspective on disk formation, evolution, and dynamics. I will review our current knowledge of the chemo-orbital structure of the disk. I will then discuss new measurements of the kinematics and chemistry of intermediate-age stars over a large part of the Galactic disk from the APOGEE survey and their implications. I will also describe how complementary data from Gaia will help complete our understanding of the formation and evolution of the Milky Way’s disk.

SESSION 4
THE STELLAR CONSTITUENTS OF THE MILKY WAY

SESSION 4A
STAR CLUSTER EVOLUTION

The open clusters in the Gaia-ESO Survey

L. Magrini, S.Randich INAF-Acetri, Italy 02/12 16:45h

The study of the population of Galactic open cluster is a key tool to understand the processes that led to the formation of the Milky Way disk and to its subsequent evolution. Open clusters constitute a wide family of similar objects, having a large range of distances and ages, thus they can be used to investigate the abundance distribution in the Galactic disk at various epochs. The Gaia-ESO survey is supplying one of the largest and homogeneous samples of open clusters covering the whole space parameters of ages, distances and metallicities. I will review some of the results obtained during the first two years, and compare them with the recent results from the literature.

Open cluster evolution and the search for the Sun’s siblings

C.A Martínez-Barbosa, A.G.A Brown, S. Portegies Zwart
Leiden University, The Netherlands 02/12 17:15h

The high eccentricities and inclinations observed for the orbits of the Edgeworth-Kuiper belt objects as well as the radioactive isotopes found in the meteorite fossil record are some of the imprints found in the solar system that suggest the Sun was born in an open cluster 4.6 Gyrs ago. In this work we study the evolution and migration of the Sun's birth cluster along its orbit through the Milky Way by means of state of the art simulations that take into account the internal processes of the open cluster as well as a model of the Galaxy that includes the contribution of a central bar and spiral arms.

We first aim to understand the distribution of plausible initial positions and velocities of the birth cluster, using the present day location and motion of the Sun as a constraint. Starting from these possible birth locations we follow the dynamical evolution of the Sun's birth cluster along its orbit through the Galaxy in order to derive the present day phase space distribution of the Sun's siblings. Our ultimate goal is to understand how the Gaia data (combined with chemical tagging) can be used to find the remnants of the Sun's birth cluster.

Finding the lost siblings of the Sun

Cheng Liu ASTRO, Lund Observatory, Sweden 02/12 17:30h

We present stellar parameters, stellar ages, and detailed elemental abundances for Na, Mg, Al, Si, Ca, Ti, Cr, Fe, and Ni for 32 solar sibling candidates. Those candidates were kinematically selected based on their proper motions, parallaxes and colours. Stellar parameters were determined through a purely spectroscopic approach and partly physical method, respectively. Comparing synthetic with observed spectra, elemental abundances were computed based on the stellar parameters obtained from partly physical method. Our abundances analysis shows that four stars are chemically homogenous together with the Sun. Technique of chemical tagging gives us a high probability that they might be from the same open cluster. Only one candidate – HIP 40317– which has solar metallicity and age could be a solar sibling. We performed simulations of the Sun's birth cluster in analytical Galactic model and found that most of the radial velocities of the solar siblings lie in the range $-10 \leq Vr \leq 10$ km s^{-1}, which is smaller than the radial velocity of HIP40317, under different Galactic parameters and different initial conditions of the Sun's birth cluster. Comparing with the Galactic velocity dispersion for star with solar age in solar neighbourhood, this does not exclude HIP 40317 as a solar sibling.

Testing the chemical tagging technique with old Open Clusters

S.Blanco,C.Soubiran,U.Heiter LAB, CNRS, France 02/12 17:45h

De Silva et al. 2007 demonstrated the chemical homogeneity of two open clusters and one moving group together with the uniqueness of their abundance patterns. These findings open the possibility of using the technique of chemical tagging to identify common formation sites in the disk as proposed by Freeman & Bland-Hawthorn 2002.
In order to apply this technique to high resolution spectra we have developed our own spectral analysis code, which we have used for the analysis of old Open Clusters observed by different spectrographs (UVES at VLT, Chile; NARVAL at TBL, France). We evaluate the viability of the chemical tagging technique by presenting the astrophysical parameters and abundances determined for those clusters.

Stellar relics from the cosmic dawn in the Milky Way bulge

M. Asplund, L. Howes, S.Keller, D.Yong, A.Casey, D. Nataf, G.Gilmore
Australian Nat.University, Camberra, Australia 02/12 18h

No Population III star has yet been found. All of these searches have targeted the Galactic halo or Local Group dwarf galaxies. According to theoretical models, however, most of the oldest and most metal-poor stars should now reside in the bulges of galaxies like the Milky Way. Until now any search for the first stars in the Galactic bulge has been considered largely hopeless due to its enormous crowding and overall metal-rich nature. We are undertaking the EMBLA survey aimed at finding the first stars in the bulge using the unique capabilities of SkyMapper to preselect metal-poor candidates and AAOmega multiplexing for spectroscopic confirmation. We have identified >500 bulge stars with [Fe/H]<-2, lower than any star studied previously. We have used VLT and Magellan to analyse ~50 of the stars with [Fe/H]<-3, enabling a detailed comparison of the chemical composition with halo stars of similar metallicity. Many of these bulge stars should have formed at redshifts z>10, making them the oldest objects in the cosmos and probing a crucial era completely inaccessible by any other means. Gaia will improve the kinematical information of the stars with Kepler-2 possibly facilitating an asteroseismic age determination in the near future.

SESSION QA2

GAIA SCIENCE – EXTENDED Q+A session

Scientific synergies of Gaia with ground based spectroscopic surveys

Alejandra Recio Observatoire Côte d'Azur, France 03/12 9h

The different galaxy formation and evolution processes have left their fingerprints on stars. These have to be searched in a high-dimensional parameter space constituted by i) chemical, ii) spatial and iii) kinematical distributions, plus iv) their temporal gradients. The Gaia mission, combined with ground based spectroscopic surveys as the Gaia-ESO Survey, GALAH, APOGEE and RAVE is opening a new era of Milky Way investigation. I will review how the combination of Gaia data with ground based spectra will reveal the fossil record of our galaxy formation history, and in particular, the chemical abundance substructure, the structural properties of the Galaxy components, the chemo-kinematical and chemo-dynamical correlations and the time evolution of the chemo-dynamical properties.The important challenges to achieve this goal will also be mentioned.

Exploring Milky Way structure and dynamics

Ralph Schönrich Oxford University, UK 03/12 9:45h

I will discuss evidence for radial migration and its implications for the structure of the Milky Way disc. I will also discuss implications of recent N-body studies and their implications, pointing out the need for systematic studies and sound comparisons to understand Galactic dynamics. In the second part of my talk I will discuss the problems arising from inconsistencies between survey analysis. The need for consistency, as well as accurate knowledge and modelling of survey errors and selection biases is exemplified in discussions on the halo of our Milky Way. I will shortly discuss our advances with a consistent platform for probabilistic stellar parameter analysis.

PhD focus: discussion session

A.Sans, S. Blanco LAB, CNRS, France 03/12 10:30h

SESSION 4B
STELLAR ASTROPHYSICS

Synergy between asteroseismology and the Gaia mission

Josefina Montalban Universita di Padova 03/12 11:30h

The Gaia mission will provide measurements of parallaxes for a billion of stars, and reveal the fine structure of the HR diagram, for all stellar populations and all phases of stellar evolution. In this talk I will present how asteroseismology can complement Gaia data and contribute to the validation of stellar and Milky Way formation and evolution models. I will also describe the contribution of Gaia to asteroseismology inference: Gaia data will allow the calibration and validation of current semi-empirical laws used in ensemble asteroseismology for stellar population studies, and also high precision determination of stellar masses from oscillation frequencies.

Highlights of the LINEAR survey

Lovro Palaversa UNIGE, Geneve, Switzerland 03/12 12h

LINEAR (Lincoln Near-Earth Asteroid Research) asteroid survey observed proximately 10,000 deg. sq. of the northern sky (14.5<r<17.5) in period roughly from 1998 to 2009. Long baseline of observations combined with good cadence provides excellent basis for investigation of variable and transient objects in this relatively faint and underexplored part of the sky.
Details covering the repurposing of this survey for use in time domain astronomy, creation of a highly reliable catalogue of approximately 7,200 periodically variable stars (RR Lyrae, eclipsing binaries, SX Phe stars and LPVs) as well as search for optical signatures of exotic transient events (such as tidal disruption event candidates), will be presented.

Detecting the Milky Way Halo Structure and Sub-Structure with OPTICS

A. Sans, J. De Ridder KU Leuven, Belgium 03/12 12:15h

The Λ-CMD model proposes that large galaxies, like the Milky Way, are the cumulative results of interactions, accretion and mergers over large time scales. Events such as these leave chemical and kinematic imprints within the host galaxy as incoming material is accreted. Thereby leaving directly observable clues to the formation and evolution within the halo of most major galaxies. In the case of the Milky Way, the stellar halo holds some of the best preserved fossils of our galaxy's formation in over-densities such as the Sagittarius Stream, Magellanic stream, and the Virgo Over-density etc. These over-densities within the Galactic halo may hold the a partial key to solving the formation and evolution of the Milk Way, however their low surface density and board spatial distribution makes direct detection troublesome and requires tiresome spatial analysis. We present preliminary results on the use of OPTICS, a density based clustering algorithm developed by Ankerst et. al. 1999, to detect structure and sub-structure within the halo. Providing a 1-D visualization of N-dimensional clustering, OPTICS allows for large data-sets to be rapidly and effectively searched for over-densities which could otherwise go undetected.

Stellar distribution in the star-forming region Gamma Velorum

T.Cantat, A.Vallenari, M.Mapelli INAF, Italy 03/12 12:30h

The analysis of the spatial distribution of stars in stellar clusters gives clues about how those systems assembled in the early stages of their formation. Spectroscopic data from the Gaia-ESO Survey revealed a complex dynamical structure in the the Gamma Velorum star-forming region. We apply statistical diagnostics and compare the observed stellar distribution with the results of ad-hoc dynamical simulations in order to study different formation scenarios.

The open clusters in the Gais ESO Surveys and beyond

A. Vallenari INAF, Italy 03/12 12:45h

The open clusters are fundamental objects to define the properties of the Galactic disk . We will discuss the Gaia view of open clusters in the early Gaia data releases, in connection with the Gaia-ESO survey, presenting also their use as validation tools.

Galactocentric variation of the abundance structure in the Milky Way stellar disk results from the Gaia-ESO survey

S.Feltzing, T.Bensby, G.Ruchti ASTRO Lund University, Sweden 03/12 13h

Being awarded 300 nights over 5 years with the FLAMES instrument on the Very Large Telescope on Paranal in Chile, the Gaia-ESO public spectroscopic survey will gather spectra for more than 100 000 stars in the Milky Way in order to map the elemental abundance structure of the main Galactic structural components. Based on data from the first 2 years of observations I will here present an investigation of how the abundance structure varies with galactocentric radius in the Galactic disk; from the bulge region to the outer disk reaching galactocentric distances of about 12-13\,kpc. In particular I will focus on abundance gradients and the relative properties of the Galactic thin and thick disks with galactocentric radius, how this can help us to constrain the scale-lengths of the two disks, and whether radial migration has played a significant role in the evolution of the Galactic disk.

SESSION 5

THE ORIGIN AND HISTORY OF THE MILKY WAY

RAVE as a Gaia precursor, what to expect from the Gaia RVS?

Matthias Steinmetz AIP, Potsdam, Germany 04/12 9h

The Radial Velocity Experiment (RAVE) is currently the largest spectroscopic survey of the Milky Way. Over a period of ten years, the RAVE teams has amassed radial velocities and stellar atmosphere parameters (temperature, surface gravity) and abundances of nearly half a million stars using the 6dF multi-object spectrograph on the 1.2-m UK Schmidt Telescope of the Anglo-Australian Observatory (AAO). Almost 580 000 spectra have been taken in the Ca-triplet region (8410-8790 Å) for 480 000 southern hemisphere stars in the magnitude range $9 < I < 13$ at a resolution of R=7500. Since the spectral range and spectral resolution are comparable to those of the Gaia RVS, RAVE can be seen as a precursor mission of Gaia RVS. The radial velocities measured in this survey are accurate to better than 2 kilometers per second. RAVE has meanwhile published four data releases, a fifth one in preparation. The most recent data release published in early 2014 features stellar atmospheric parameters (effective temperature, surface gravity, overall metallicity), radial velocities, individual abundances and distances determined for some 420 thousand stars; it is currently the largest and most homogeneous data set available for Galactic archeology studies. Science applications of RAVE include the identification of substructure in the Milky Way and to derive constraints on the gravitational potential of our Galaxy.

SESSION 5A

ARCHAEOLOGY OF THE MILKY WAY

New observational constraints to chemodynamical models of the MW

C. Chiappini AIP, Potsdam, Germany 04/12 9:30h

Several are the processes contributing to the formation and evolution of our Galaxy, among which gas accretion, mergers and radial migration. The main question now is to understand which of these processes dominate the different phases of the Galaxy's evolution. Large samples of stars start to be available for which we have information on position, chemistry and kinematics. The main bottle neck remaining are the need for precise proper motions (and hence less uncertain orbital parameters), ages and distances. In all these Gaia is expected to be a revolution. I will show examples of where do we stand in terms of chemodynamical models for the MW, and observational constraints from current large surveys such as RAVE, SEGUE, APOGEE and Gaia-ESO.

Large scale structure of the Inner Milky Way

Iulia Simion IoA, Univ. Cambridge, UK 04/12 10h

The central components (e.g. the bugle, the bar) of disc galaxies hold key information about the formation and evolution of spiral galaxies, providing important constraints on the different processes driving the history of Galaxy assembly. We study the structure of the inner Milky Way using the latest data release of the Vista Variables in the Via Lactea (VVV) survey. The VVV is a deep (~ 4 mag deeper than 2MASS), near-infrared, multi-colour (Z,Y,J,H,Ks) photometric survey with a coverage of over 320 square degrees towards the bulge region. We use the photometric properties of the Red Clump (RC) stars to build a high resolution 1'x1' interstellar extinction map. From the reddened colour-magnitude diagrams (CMDs) we extract the giant branch population to investigate their 3D density distribution in the central 4-6 kpc of the MW. We present the results of our study.

Blue Horizontal Branch Stars in Pan-STARRS: The Galactic Halo

J. Vickers, A. P. Huxor, E.K. Grebel ARI Heidelberg,Germany 04/12 10:15h

One of the most widely used stellar tracers is blue horizontal branch stars, which are prized for their predictable and substantial intrinsic brightness's and their old ages. Using still proprietary Panoramic Survey Telescope and Rapid Response System data, we investigate the distribution of blue horizontal branch stars in the 3pi footprint of that survey. From this, we rediscover a number of well known Milky Way features and discover a new constraining detection of the Sagittarius tidal streams.

Substructure in galaxy discs: Identifying secularly evolved populations

M.Molloy,M.Smith,J.Shen,W.Evans KIAA/PKU, Xina 04/12 10:30h

We describe a new method for analysing N-body simulations. The method makes a blind search for resonant orbits by making use of the fact that resonant orbits will return to some previously occupied region of phase space. An application of this method is made to the N-body simulation of Shen et al. (2010). The simulation is host to a strong and persistent central bar that drives resonances and angular momentum exchange, even in the outer parts of the disc. We deconstruct the barred disc into it's constituent resonant orbit families. We then study the contribution of each orbit family to the kinematic landscape around the disc.

Statistical analysis of large scale surveys for constraining the Galaxy evolution

A. M.M. Martins and A. Robin UTINAM,France 04/12 10:45h

The formation and evolution of the thick disc of the Milky Way remain controversial. We make use of the Besancon model (Robin et al. 2003), which among other utilities can be used for data interpretation and to test different scenarios of galaxy formation and evolution. We examine these questions by studying the metallicity distribution of the thin and thick disc with the help of spectroscopy. We selected a sample of Main Sequence turn-off stars from the SEGUE survey (Cheng et al 2012) and a sample of F/G/K stars from Gaia-ESO. We developed a tool based on a MCMC-ABC method to determine the metallicity distribution and study the correlation between the fitted parameters. For SEGUE we obtained a solar neighbourhood (SN) metallicity of the thick disc of -0.47 ± 0.03 dex similar to previous studies and the thick disc shows no gradient but the data are compatible with an inner positive gradient followed by a outer negative one. For Gaia-ESO survey we obtained a SN metallicity in the thick disc of -0.23 ± 0.04 dex and a radial metallicity gradient for the thick disc of 0.011 ± 0.024 dex kpc−1. These results will be compared with literature values and discussed with regards to possible formation and evolution scenarios for the thick disc.

SESSION 5B
GALACTIC STRUCTURE AND EVOLUTION

Hunting for debris in the disc

J.Read, G.Ruchti, S.Feltzing, A.Pipino, T.Bensby University of Surrey, UK 04/12 11:30h

TBD

Assessing the influence of astronomical phenomena on the Earth

F.Feng, C. Bailer MPIA, Heidelberg, Germany 04/12 12h

We have assessed what evidence there is for an influence of astronomical phenomena on the Earth. Plausible mechanisms which may have an influence include gravitational perturbations (e.g. via bolide impacts), nearby supernovae (cosmic ray flux), variations of Earth's orbit and spin, etc..
By simulating the Sun's orbit in the Galaxy and the Oort cloud perturbed by the Galactic tide and stellar encounters, we build time series models for variations of biodiversity recorded in fossils and terrestrial impacts recorded by craters on the Earth. Comparing these models in the Bayesian framework, we have found that astronomical phenomena purely dependent on the local stellar density cannot explain the variation of extinction rate in the past 550 Myr, and cometary impacts (as opposed to just asteroids) contribute to a small fraction of terrestrial craters over the past 250 Myr. We also apply the above modeling and inference approach to terrestrial delta18O records to explore the role of Milankovitch forcings (obliquity, precession and eccentricity) in causing the climate change over the past 2 Myr. We have found that obliquity mainly paces the deglaciations over the past 2 Myr while precession becomes important impacting deglaciations over the past 1 Myr. Our conclusions are not sensitive to many model parameters.

Constraints on thin and thick disc formation from new analysis of 2MASS and SDSS surveys

A.Robin,, E.B. Amores, C. Reylé, A.M.M. Martins UTINAM, France 04/12 12:15h

Two new analysis of SDSS and 2MASS surveys are used to constrain the characteristics of the thin and thick disc of the Milky Way, based on a population synthesis model and a MCMC scheme to constrain model parameters. These studies show that 1) the thick disc has been formed during an extended period of time and it was contracting during this phase; 2) the external thin disc is shown to have characteristics which vary with age such as the scale length, warp orientation, warp and flare slopes. We analyse the consequences for the formation of these structures.

Orbit of the Ophiuchus Stream

B.Sesar MPIA, Heidelberg, Germany 04/12 12:30h

Ophiuchus Stream is the most recently discovered stellar stream in the Milky Way (Bernard et al. 2014). Due to its location (~5 kpc from the Galactic center) and its puzzling morphology (a thin and short stream, and yet with no visible progenitor), this stream may represent an important piece in our efforts to understand the Galactic potential and the dynamical evolution of accreted structures. In this talk, I will present a follow-up study of the stream during which we obtained high-quality spectroscopic data on 14 stream member stars using Keck and MMT telescopes. I will show how these newly acquired spectroscopic and existing photometric data enabled us to constrain i) the distance of the stream, ii) the full 3D kinematics of the stream, iii) the chemical properties of the stream and the nature of its progenitor, and iv) the orbit of the stream. I will finish by discussing prospects for characterization of stellar streams by combining Pan-STARRS1, Palomar Transient Factory, and GAIA data.

The Perseus arm stellar overdensity at 1.6 kpc

M.Monguió, P.Grosbol, F. Figueras Universitat Alacant,Spain 04/12 12:45h

We detected the stellar overdensity associated to the Perseus arm in the anticenter direction through individual star counts. The physical parameters derived from Strömgren photometric data were used to compute the surface density distribution as a function of galactocentric distance for different samples of intermediate young stars. The Perseus arm stellar overdensity was located at 1.6±0.2 kpc from the Sun with a significance of 4-5 sigma and a surface density amplitude of around 10%, slightly depending on the sample used. Values for the radial scale length of the Galactic disk have been simultaneously fitted obtaining values in the range [2.9,3.5] kpc for the population of the B4-A1 stars. Moreover, the radial distribution of the interstellar absorption derived is coherent with a dust layer in front of the Perseus arm. This is the first time that the presence of the Perseus arm stellar overdensity has been detected hrough individual star counts, and its location matches with a variation in the dust distribution. The offset between the dust lane and the overdensity indicates that the Perseus arm is placed inside the co-rotation radius of the Milky Way spiral pattern.

SESSION 5C

GAIA, GALACTIC SURVEYS, MODELLING, SYNERGIES

Dynamical models of the Galactic Disk

Hans-Walter Rix MPIA, Heidelberg, Germany 04/12 14:30h

I will present an option for rigorous dynamical models of the Galactic disk, which ingests position, velocity and abundance information on individual stars, from ground-based surveys and from Gaia. Even with current data, this provides unprecedented constraints on the Galactic potential around the Sun. Scaling this to the full Gaia data set will pose a formidable challenge. Incorporating the spatial selection function, accounting for dust extinction and mitigating the impact of currently unavoidable modelling assumptions will require much attention.

From SDSS to Gaia and LSST

Zeljko Ivezic University of Washington, USA 04/12 15h

Most studies of the Milky Way can be described as investigations of the stellar distribution, in the seven-dimensional phase space spanned by the three spatial
coordinates, three velocity components, and metallicity. These statistical studies have been recently reinvigorated by the advent of modern large scale surveys such as, most notably but not exclusively, SDSS. With SDSS, it has become possible to detect even dwarf main-sequence stars to a distance limit exceeding 10 kpc, and thus to probe both the disk and halo populations within the same data set. The precision of these results will be greatly improved with Gaia data that will be almost as deep as SDSS, and extended further in distance with LSST that will exceed the SDSS depth by as much as five magnitudes. I will use a few recent SDSS-based statistical studies of the stellar populations to illustrate what kind of improvements to expect from Gaia and LSST, and will argue that Gaia and LSST will be highly complementary datasets for studying the Milky Way.

The Galactic Archaeology with HERMES (GALAH) Survey

J.Bland-Hawthorn University of Sidney,Australia 04/12 15:30h

The GALAH (GALactic Archaeology with HERMES) survey is a large Australian-led project that will measure up to 30 elemental abundances and radial velocities of 1 million stars in the Milky Way. Using the new HERMES spectrograph at the Anglo-Australian Telescope, GALAH takes high-quality (S/N>100), high-resolution (R~28,000) spectra for up to 400 stars per hour. I will discuss the scientific goals of GALAH: to "chemically trace" individual components of the Galaxy, to "chemically tag" groups of stars in the Galactic disk, which are most likely long-disrupted star clusters, and to decipher the history of star formation, chemical enrichment, stellar migration and minor mergers in the Milky Way. More than 100,000 stars will have been observed by the end of 2014. I will also discuss our parallel project, the Kepler K2 Galactic Archaeology survey, which seeks to derive seismic parameters for many GALAH stars.

Radial velocities and chemical tagging with WEAVE at the WHT

Marc Balcells ING, LA Palma, Spain 04/12 16h

It has long been recognised that much of Gaia's science needs ground-based spectroscopy for radial velocities and chemical tagging. WEAVE (www.ing.iac.es/weave), a multi-fibre spectrograph, is being built to cover this need. The planned surveys will cover the northern and equatorial regions of the Milky Way using its two spectroscopic resolutions - R=5000 and R=20,000. A large European-wide team is preparing survey execution and scientific exploitation.

SESSION 5D
GALACTIC DYNAMICS

A multi-scale approach to simulate the Galaxy

Luis Aguilar UNAM, México 04/12 16:45h

Our view of the structure and dynamics of our Galaxy has progressed pushed by the acquisition of ever larger datasets that encompass wider perspectives.
At the dawn of the Gaia era, we are about to enter a phase of unprecedent detail in our view of the stellar component of our Galaxy. Such richness of data opens up the possibility of using new analysis tools, or the use of traditional tools at newer scales, to analyze and extract knowledge about our galactic surroundings. We will review several tools being developed by our group to construct realistic Gaia mock catalogues, and their use to test novel techniques to characterize the central bar and the warp of the galactic disc, as well as indentifying tidal tails and ultra faint dwarf galaxies in the galactic halo.

On the characterization of the Galactic warp in the Gaia era

H. Abedi, F.Figueras, L.Aguilar, C.Mateu, M.Romero, M. López, F. Garzón
ICC-UB / IEEC, Spain 04/12 17:15h

We explore the possibility of detecting and characterizing the warp of the stellar disc of the Milky Way using synthetic Gaia data. A new kinematic model for the warp is proposed. We use random realizations of test particles which evolve in a realistic Galactic potential that is warped adiabatically to various final configurations. In some cases a twist is introduced additionally. The Gaia observational constraints, its errors model and a realistic 3D extinction map are applied to mimic three tracer populations: OB, A and Red Clump stars. A family of Great Circle Cell Counts (GC3) methods is used to detect and measure the warp parameters. Moreover, using Red Clump stars from UCAC4 star catalogue, we search for the kinematic signature of the warp in the observational space of Galactic proper motions. We realize this kinematic signature is, at present, blurred by the uncertainty in the residual rotation of the reference frame of now available astrometric catalogues with respect to the inertial extragalactic one. We discuss how Gaia will solve for that.

What can Gaia proper motions tell us about Milky Way dwarf galaxies?

S. Jin, A. Helmi, M. Breddels RUG, The Netherlands 04/12 17:30h

Proper motions from Gaia will open a new window in the field of dynamical studies of Galactic substructure, eliminating the need for kinematic inferences in their absence. Access to 6D phase-space coordinates will pave the way for greatly improved orbital modelling of all components of the Milky Way including its satellite galaxies and stellar streams, in turn placing stricter constraints on global properties of our Galaxy such as its total mass. This, however, relies on our ability to deduce robust proper motions of the substructures of interest. I will present results from an ongoing study aimed at answering the following question and its ancillaries: how many measurements of individual stellar proper motions with Gaia accuracies are needed in order to deduce reliable proper motions for Milky Way satellites? Using Sculptor as an example system, I will show that proper motion measurements for a large -- but not unrealistic -- number of stars in a Milky Way dwarf galaxy is sufficient to resolve the proper motion of the satellite. The study also addresses the requirements in data accuracy for measuring a rotation signal, and whether it would be possible to infer the galaxy's velocity anisotropy from Gaia-accuracy data.

Stellar motion around co-rotating spiral arm: Gaia Mock data

D. Kawata, J.Hunt, R. Grand, S. Pasetto, M.Cropper MSSL/UCL, UK 04/12 17:45h

We have observed a snapshot of our N-body/smoothed particle hydrodynamics simulation of a Milky Way-sized barred spiral galaxy in a similar way to how we can observe the Milky Way. The simulated galaxy shows a co-rotating spiral arm, i.e. the spiral arm rotates with the same speed as the circular speed. We observed the rotation velocities of the stars as a function of the distance from our assumed location of the observer at the three lines of sight on the disc plane, (l, b) = (90, 0), (120, 0) and (150, 0) deg. We find that the stars tend to rotate slower (faster) behind (at the front of) the spiral arm and move outwards (inwards), because of the radial migration. We also generate stellar sample from the simulated star particles. Taking into account the extinction, stellar population and the expected Gaia errors, we have generated the Gaia mock data in these line-of-sights, and demonstrate that the Gaia data are good enough to detect these kinematic signatures of the co-rotating arms.

Hypervelocity stars in the Gaia era

Elena M. Rossi Ledien Observatory, The Netherlands 04/12 18h

Hypervelocity stars (HVSs) are stars that are observed in the halo of our Galaxy, travelling with a radial velocity in excess of the local escape velocity form the Galaxy. Their origin can teach us about stellar dynamics close to our supermassive black hole and their trajectories can allowed us to map the Galactic potential. However, their potential has not yet been fully exploited because of the small number (~21) discovered so far. In my talk, I will show how Gaia can be a great discoverer of HVSs and how with its accurate measurements can teach us about the Galaxy in a novel way.

Cool runaways - Nearby Hills ejecta as a probe of the gravitational potential of the Milky Way

M.Smith, J. Vickers, Y.Zhang SHAO, Xina 04/12 18:15h

It is now known that the centre of the Milky Way hosts a super-massive black hole. This black hole can disrupt nearby stellar binaries, due to dynamical interactions, resulting in one of the stars being flung from the centre of the Galaxy at exceptionally high speeds. These so-called Hills stars, or hyper-velocity stars, have been found in the halo of the Milky Way in the form of young A-type stars. However, it has been predicted that there should also be a population of older, cooler Hills stars. We search for such stars in the solar neighbourhood using data from SDSS and report a number of promising candidates. As well as providing valuable insights into the shrouded populations of the central region of the Galaxy, they are important probes of the mass distribution in the Milky Way. With precise 3D velocities and positions, the orbits of these stars can be used to measure the gravitational potential, illuminating the dark matter distribution in the inner-parts of the Galaxy.

SESSION 6
GRAND CHALLENGES FROM GAIA

SESSION 6A
THE DISTANCE SCALE

Gaia, Variable Stars and the Distance Scale

P. Whitelock, M. Feast SAAO, South Africa 05/12 9h

Our entire understanding of astrophysics and cosmology is dependent on the distances to astronomical objects. The astrometric data from Gaia will directly revolutionize our understanding of Galactic structure through its precise parallaxes and proper-motions. More importantly Gaia will provide a new calibration of various standard-candles, including Cepheid-, RR Lyr- and Mira-variables, which are fundamental to our understanding of Galactic structure and to the extragalactic distance scale. We review our current understanding of variable stars and the distance scale, illustrated with some recent results, and describe what might be expected from Gaia. We also describe some of the challenges and emphasize the need for complementary ground-based observations to maximize the return from Gaia.

Astrostatistics for luminosity calibration in the Gaia era

Max Palmer ICC-UB / IEEC, Spain 05/12 9:30h

With Gaia currently in nominal mission mode and sending data to earth, the challenge for the astronomical community is to prepare for the use of what will be at the time of release one of the largest and most complex astronomical catalogues ever produced. Use of parallax data is not straightforward due to the presence of many statistical biases and selection effects. We present an overview of the techniques required for correct use of the Gaia parallax information, which relies on statistical modelling of the data in order to infer derived quantities such as distance and absolute magnitude in an unbiased way. The methods rely on a Bayesian methodology and have been applied to case studies on normal stars, variable stars, open clusters and the LMC.

Improving the cosmic distance ladder. Distance and structure of the large Magellanic Cloud

Tatiana Muraveva INAF, Italy 05/12 9:45h

The Large Magellanic Cloud (LMC) is the closest large satellite of the Milky Way and the first step of the cosmic distance ladder, hence knowing the distance to the LMC and its three dimensional structure contributes to the definition of the entire cosmic distance scale. The main goal of current research work is the determination of the distance to the LMC and the study of the galaxy structure by exploiting different distance indicators: Classical Cepheids (CCs), RR Lyrae stars and “hot” eclipsing binary stars. These objects represent stellar populations of different ages and thus trace different features of the galaxy such as the bar, spiral arms, the halo and star forming regions. The near-infrared photometry obtained by the VISTA for Magellanic Clouds (VMC) survey, and visual photometry obtained by the OGLE III, OGLE IV and the EROS-2 surveys, are used.

Infrared survey of variable stars toward the bulge and beyond

Noriyuki Matsunaga University of Tokyo, Japan 05/12 10h

The severe interstellar extinction toward the Galactic plane prevented us from investigating stellar populations in these regions. Pulsating variable stars, in particular Cepheids and Miras, are useful tracers for which we can determine the distances and ages accurately. Since they are bright and can be observed at a wide range of distances, infrared observations of these variable stars in the obscured regions would provide useful information on the Milky Way. These objects can also play complimentary roles to Gaia because that the highly-obscured objects cannot be detected by Gaia and their distances give independent distance scales based on their period-luminosity relations. We have carried out a near-infrared survey of variable stars toward the bulge, the Galactic longitude between -10 and +10 degree, using the IRSF 1.4m telescope in South Africa. We discovered more than 5,000 variable stars, most of which are long-period variables including Miras. On the other hand, 96 variable stars are found to have periods shorter than 60 days, and we classified 24 as classical Cepheids and found that they are separated into two groups: ones in the Nuclear Stellar Disk, ~200 pc around the Galactic Center, and the others beyond the bulge.

Three-dimensional extinction mapping using Gaussian random fields

S. Sale, J. Magorrian OX Physics, Univ.Oxford,UK 05/12 10:15h

Disentangling the 3D structure of interstellar extinction is a key requirement for understanding the Galaxy and a crucial step towards taking full advantage of the data Gaia will provide. We present a scheme for using stellar catalogues to map the three-dimensional distributions of extinction and dust within our Galaxy, employing Gaussian random fields and a simple physical model of the interstellar medium that assumes a Kolmogorov-like power spectrum of turbulent fluctuations. As extinction is modelled as a random field, the spatial resolution of the resulting maps is set naturally by the data available; there is no need to impose any spatial binning. This method is then demonstrated on data from existing surveys - obtaining results that are significantly more precise than those of older techniques and without the non-physical features present in previous results. Finally we consider the application of the technique to data from Gaia, showing simulations of the results potentially obtainable and discussing the technical challenges that must first be overcome.

SESSION 6B
THE TRANSIENT SKY

Supernovae

Rubina Kotak Queen’s University Belfast, UK 05/12 11h

TBD

Gaia: switching on the transient discovery machine

N. Blagoródnova, N.Walton, S.Koposov IoA, Univ.Cambridge,UK 05/12 11:30h

Gaia is a powerful transient discovery machine, providing simultaneous HST-like spatial resolution, high accuracy astrometry and low-resolution spectrophotometry for each observation. In late August 2014 the mission had started its nominal operation mode, discovering its first Gaia Supernova (Gaia14aaa) just two weeks after! In this talk I will discuss the power of Gaia as a transient survey and its detection capabilities, with a special emphasis on nuclear transients. I will also discuss the performance of GS-TEC, the automated realtime classification of low-resolution Gaia spectro-photometry and the results from the first three months of mission data.

Gaia Science Alerts

Morgan Fraser IoA Cambridge Univ. ,UK 05/12 11:45h

Gaia, launched in December 2013, is the major space astronomical mission of the decade. It routinely scans the entire sky multiple times, which is used for finding unexpected and dramatic changes in the sky. The near-real-time data analysis allows for relatively early detections of numerous supernovae, novae, microlensing events, tidal disruption events and many other exotic and rare transient events. I will describe how the data processing pipeline operates, how Gaia data is utilised for robust classification of the events and will show the first detections and lessons learnt in in the early mission. I will also present the status of the ground-based network of telescopes which aims at providing continuous follow-up data for the most interesting transients.

Eclipsing binaries in the Gaia era: automated detection performance

B.Holl, N. Mowlavi, I. Lecoeur-Taïbi, L. Rimoldini, L. Guy, L. Eyer, F. Barblan, F. Bouchy, M. Sueveges, K. Nienartowicz, D. Ordonez-Blanco, I. Ruiz
UNIGE, Switzerland 05/12 12h

Binary systems have periods from a fraction of a day to several years, and exist in a large range of possible configurations at various evolutionary stages. About 2% of them are oriented such that eclipses can be observed. Such observations provide unique opportunities for the determination of their orbital and stellar parameters. The large-scale multi-epoch ESA Gaia mission will observe an unprecedented sample of millions of eclipsing binaries that allow for statistical studies of binary systems.
A key challenge of the detection and period determination of eclipsing binaries is the automation of the procedure. Such an automated pipeline is being developed within the Gaia Data Processing Analyses Consortium, in the framework of automated detection and identification of various types of photometric variable objects. We discuss the performance of this pipeline on eclipsing binaries using simulated Gaia data and the Hipparcos catalog. We show that we can detect a wide range of binary systems and very often determine their orbital periods and sub-classification from photometry alone, even for relatively sparse sampled data. For a subset of these eclipsing systems, Gaia radial velocities and astrometric orbital parameters will further complement the light curves.

SESSION 7
BEYOND GAIA, BEYOND GREAT

Space astrometry in the Gaia era

Anthony Brown Leiden University, The Netherlands 05/12 12:15h

I will discuss possible future directions in space astrometry.

GREAT2Net - Networking in the Era of Gaia

Nicholas Walton IoA Cambridge Univ., UK 05/12 12:45h

I will review the progress of the GREAT Research Network Programme (RNP) (http://www.great-esf.eu), supported by the European Science Foundation, which has run from Feb 2010, and will complete in Aug 2015. During this time it has supported a wide range of networking events, including conferences, workshops, training schools and exchange visits. These events and visits have helped develop a range of programmes, research initiatives, and supporting developments, all increasing the scientific value of the upcoming Gaia data. I will note a number of the significant network activities. I will then describe how the upcoming GREAT2Net community programme will be able to build on the success of the GREAT RNP, in enabling pan-European scale networking, and potential building, in the era of the Gaia data releases.


The Milky Way Unraveled by Gaia
GREAT Science from the Gaia Data Releases

POSTERS

P1 Carbon stars within the Gais-ESO survey

C. Abia, S. Van Eck, T. Merle, T. Masseron & D. Hatzidimitriou

We present the detection and chemcial analysis of carbon en-riched stars within the Gaia-ESO survey. In a first step, carbon-enriched candidates are detected from the analysis of a series of enhanced molecular features, measured through narrow-band spectroscopic filters. Then, the atmospheric parameters, % ratios and s-process element abundances are determined. The nature of these carbon-enriched stars is discussed together with expected impact of the Gaia mission on the knowledge of these objects in the Milky Way.

P2 Star-planet connection through metallicity

V.Zh. Adibekyan, P. Figueira, N.C. Santos, G. Israelian, A. Mortier, C.Mordasini, E. Delgado Mena, S.G. Sousa, A.C.M. Correia, M. Oshagh

Using a large sample of FGK dwarf hosts (from SWEET-Cat database) we show that planets orbiting metal-poor stars have longer periods than those in metal-rich systems. This trend is valid for masses at least from 10 MEarth to 4 Mjup. We also found that Earth-like planets orbiting metal-rich stars alwaysshow shorter periods (fewer than 20 days) than those orbiting metal-poor stars. Our results suggest that the planets in the P-MP diagram are evolving differently because of a mechanism that operates over a wide range of planetary masses. This mechanism is stronger or weaker, depending on the metallicity of the respective system.One possibility is that planets in metal-poor disks form farther out from their central star and/or they form later and do not have time to migrate as far as the planets in metal-rich systems.

P3 On the detection of satellite galaxies of the Milky Way with Gaia photometry

Jairo A. Alzate-Trujillo

We study the detection possibility of satellite galaxies of the Milky Way in Gaia's photometric system. This by mean of two main steps: first the generation of a stellar background, and second, build a dwarf galaxy. All of this photometric and simulated data is transformed to the Gaia band, and followed by discussion about its detection.

P4 Exploring the orbits of the stars via chemical tagging techniques

Borja Anguiano

Using the chemical groups identified by Mitschang et al. 2013 on a local sample of around 700 stars observed with high-resolution spectroscopy, I will report some properties on the orbital parameters (Rmin, Rmax, eccentricity, Zmax, angular momentum, orbital energy) and their temporal evolution and how we can use this information for understanding the radial migration theory in a real disk. I will also mention the GALAH survey where this kind of studies will be possible for a sample 1000 times larger thanks to the synergies with Gaia.

P5 Will Gaia see TP-AGB stars in the Galactic halo?

Gustavo Bruzual

Recent developments in the theoretical treatment of the evolution of TP-AGB stars

has allowed us to make realistic models that reproduce the luminosity function of these stars in the LMC and SMC galaxies observed by the SAGE collaboration. Our models follow the evolution of individual stars in these galaxies formed according to the time and metallicity dependent star formation laws in these galaxies. I will use these models to predict the number of TP-AGB stars expected in the halo of the Milky Way galaxy according to the accepted star formation history of the Galaxy. TP-AGB stars in the galactic halo may come also from the remnants of satellite galaxies which have been cannibalized by our galaxy. I will explore the detectability of these stars in the Gaia photometric system depending on the age, metallicity, and star formation history of the satellite galaxies.

P6 Characterisation of the Gaia photometry

Carrasco, J.M.; Jordi, C.; Fabricius, C.; Voss, H.; Weiler, M.

Our team at the University of Barcelona has contributed since the early phases of the mission to the definition, evaluation and calibration modelling of the Gaia photometry. To maximise the Gaia scientific exploitation, we have frequently shared with the astronomical community many different tools and data.
Among this information we have several relationships among colours involving Gaia magnitudes and colours from other commonly used photometric systems (Johnson-Cousins, SDSS, Hipparcos, Tycho and 2MASS) for several types of stars (including white dwarfs). These relationships can be used for planning scientific exploitation of Gaia data, performing simulations of the Gaia-like sky, planning ground-based complementary observations and for building catalogues with auxiliary data for the Gaia data validation. During the commissioning phase our team (as part of the Payload Experts group) has been intensively checking the first photometric data to analyze the health and properties of the true instrument. These preliminary analyses allowed us to monitor the throughput variations with time, assess the spectral resolution and re-evaluate the performances of the end-of-mission photometry. The Payload Experts group activities continue beyond the commissioning phase aiming to optimize the operations onboard for maximizing the scientific return. Some example of first spectra and photometry will be shown.

P7 The OCCASO Survey

L. Casamiquela, R. Carrera, C. Jordi, L. Balaguer-Núñez

Galactic Open Clusters (OCs) are key to investigate the formation and evolution of the Galactic disk. However, complete information is available for only ~5% of the about 2100 OCs known in the Milky Way. Therefore OCs are main targets of the Gaia mission and ground spectroscopic surveys. However, these surveys are sampling only Southern OCs (GES, GALAH) or in an heterogeneous way, e.g. different number of stars and spectral types in each system (APOGEE). To complement these surveys we are developing the Open Clusters Chemical Abundances from Spanish OBSERVATORIES Survey (OCCASO). Its goal is to obtain detailed abundances for about 20 chemical species in red clump stars belonging to 25 northern OCs. OCCASO was selected as a Long-term Program in the Canary Islands Observatories and it is obtaining regularly observing time at the Calar Alto Observatory. During the first year and a half we have acquired spectra for more than 90 stars in 18 OCs, 11 of which have its observations completed with at least 6 star

per cluster. In this talk we will describe the survey design and observational strategy and we will present the first results of the chemical abundances obtained in the first year and a half of observations.

P8 The nearest High-Velocity stars revealed by LAMOST data release 1

Li CHEN, Jing ZHONG, Jinliang HOU, Zhenyi SHAO, et al.

We report the discovery of 28 candidate high-velocity stars (HVSs) at heliocentric distances of less than 3 kpc,based on the Large Sky Area Multi-Object Fiber Spectroscopic Telescope (LAMOST) Data Release 1. Our sample of HVS candidates covers a much broader color range than the equivalent ranges discussed in previous studies and comprises the first and largest sample of HVSs in the immediate solar neighborhood. Our results also highlight the great potential of discovering statistically large numbers of HVSs of different spectral types in LAMOST survey data. This will ultimately enable us to achieve a better understanding of the nature of Galactic HVSs and their ejection mechanisms, and to constrain the structure of theGalaxy.

P9 Chemical Abundances in the Open Cluster NGC6791 from APOGEE spectra

Katia Cunha , Verne Smith

The open cluster NGC 6791 is very old and also very metal rich. Due to its high metallicity [Fe/H]=+0.35), it is one of the calibration clusters for APOGEE. We will present chemical abundance results for 15 elements from a manual abundance analysis of the APOGEE spectra of a sample of red-giants and clump stars in NGC6791.Results will be compared with the ones obtained by the APOGEE automatic abundance pipeline. We find no evidence for two populations in this cluster, unlike previous reports in the literature.

P10 The TOROS and TORITOS projects

M. Diaz, M. Beroiz, C. Torres, M. Benacquista, D. Garcia, M. Dominguez, B. Sanchez, L. Macri

The TOROS project consists of two different stages. The TOROS collaboration will operate for both stages telescopes at the Cordón Macón astronomical park in the province of Salta, Argentina. The site is located at latitude 24.61 South and longitude 67.32 West, at an altitude of 4,650 meters in the plateau of the Atacama dessert. The site has excellent conditions for astronomical observations (90% of useful nights and median seeing of 0.7 arcsec). Similarly both will dedicated to the follow up of optical counterparts of aLIGO and AdVIRGO triggers. This poster describes the main characteristics of both instruments and the strategy to implement observation and characterization of these transients.

P11 Optical Cartography of the Northern Galactic Plane with IPHAS

Hywel Farnhill

The INT Photometric H-alpha Survey (IPHAS) recently published its second data release, covering more than 1800 sq. deg. of the Northern Galactic Plane in r', i', and narrow-band Halpha filters. Its broad-band photometry down to 19th magnitude has been used to produce high resolution density maps of the Galactic Plane, with the effects of incompleteness fully accounted for. I will discuss the generation of these data products which will serve as useful tests of Galactic population models and a useful tool for spectroscopic surveys in the Galactic Plane.

P12 Potential of the Galaxy from the Besançon Galaxy Model including the triaxial bar.

J. G. Fernández-Trincado, A. C. Robin and C. Reyne

We present a preliminary attempt to include a bar potential in the previously axisymmetric potential of the Besancon Galaxy model (hereafter BGM; Robin et al. 2003, 2012), consistently with the mass model. The contribution of the triaxial bar is modeled by superposition of four homogeneous ellipsoids to approximate the observed density law (Freudenreich 1998). Finally, we have computed the field forces and potential according to the methodology described by Pichardo et al. (2004) in order to constraint the total mass of the Milky Way. We shall present the new fit to the rotation curve and constraints on the dark halo shape. This new approach allows us to use the new dynamical constraints (old BGM + triaxial bar) and predictions of kinematics and comparison with upcoming large-scale survey such as RAVE, BRAVA, APOGEE, and GAIA in the near future.

P13 The Gaia hybrid catalogue, a leverage to find Galactic structures

M. Fouesneau

The undergoing Gaia mission will undertake an astrometric, photometric and spectroscopic survey of the Galaxy. The Gaia consortium will use the direct data, or gaia data only, to classify objects and estimate their individual astrophysical parameters. However, one can achieve more reliable estimates of stellar parameters by combining Gaia data with data from other spectroscopic and photometric surveys.
The Gaia ``hybrid catalog'' project will provide an exquisite value-added catalogs of astrophysical parameters for Gaia targets by taking into account the ``obvious'' non-Gaia data (\eg, SDSS, WISE, Pan-STARRS, APOGEE). By including spectroscopic metallicity determinations when available, or infrared photometry will allow us to break through the degeneracies between extinction and temperature that hampers the accuracy of studying astrophysical parameters of individual stars.
While I will demonstrate the leverage that Gaia can offer when combined with other datasets, I will also highlight the challenges of making such hybrid catalogs. I will show the sensitivity to finding highly disrupted star clusters and its members by combining photometry outside the Gaia coverage and proper motions

P14 GUASOM: Gaia Utility for Analysis and Knowledge Discovery based on Self Organizing Maps

D.Fustes, M.Manteiga, C.Dafonte, B.Arcay, M.A.Álvarez, D.Garabato

We present a method for knowledge analysis in large astronomical spectrophotometric archives. The method is based on a type of unsupervised learning Artificial Neural Networks named Self-organizing maps (SOMs). SOMs are used to organize the information in clusters of objects, as homogeneously as possible according to their spectral energy distributions, and to project them onto a 2D grid where the data structure can be visualized. Our algorithm has been tested by means of simulated Gaia spectrophotometry, which is based on SDSS observations and theoretical spectral libraries covering a wide sample of astronomical objects. We demonstrate the usefulness of the method by analyzing the spectra that were rejected by the SDSS spectroscopic classification pipeline and thus classified as “UNKNOWN”.

P15 Benchmark stars for cross-calibration of Galactic stellar surveys.

U. Heiter, P. Jofré, A. Korn, C. Soubiran, F. Thévenin, S. Blanco-Cuaresma

Various Galactic stellar spectroscopic surveys are currently underway, and each is expected to achieve high internal accuracy in terms of stellar parameters and abundances. A number of questions related to the formation and evolution of the Galaxy may be addressed based on samples of stars observed within each survey. In addition, complementary samples of stars may be constructed by combining data from different surveys. The Gaia FGK Benchmark Stars provide the necessary link to bring the quantities measured from different spectra with different methods onto the same scale. We will discuss the quality of the fundamental determinations of effective temperature and surface gravity for the set of about 30 stars, and present the currently recommended reference values for the atmospheric parameters. An outlook on future developments will also be given.

P16 LAMOST Open Clusters survey: current status and perspective

Jinliang HOU, Li CHEN, Jing ZHONG, Zhenyi , Chien-Cheng LIN

LAMOST has obtained more than 2M stellar spectra during the first 2 years formal survey periods. Among them, there are up to 1000 open clusters regions were observed (partly) by the LAMOST (mostly in the Galactic Anti-center region), and some clusters have more than 1000 member stars be observed. This has provided a great chances to statistically study the clusters properties and also using them to study the Galactic structure. In this presentation, I will introduce the preliminary results about some open clústers observed by the LAMOST.

P17 Tracing the Sagittarius Tidal Streams in Carbon Long Period Variables

Avon Huxor & Eva Grebel

We have assembled a sample of~120 pectroscopically confirmed AGB carbon stars from the literature, exhibiting measurable variability in the Catalina Surveys. The period and amplitudes are used to estimate distances, exploiting known period-luminosity relationships. We compare the locations of these stars, and radial velocities where available, to computer models of the Sagittarius dSph accretion. We find that the data match the Law & Majewski model for the leading arm, but we fail to find the trailing arm north of the Galactic Plane. Our result supports more recent models in which the trailing arm apocentre reaches to ~100 kpc. Our data also suggests that there are few, if any, other intermediate-age stellar substructures in the Catalina footprint.

P18 Time variation of differential reddening towards NGC 4833

Johanna Itam Daniel Pfenniger Gérard Jasniewicz Denis Puy Nicolas Mauron

Light passing through clouds of atomic and/or molecular hydrogen is significantly obscured by the dust they contain. One of the major questions in the study of the interstellar medium is the size of the smallest structure of these neutral clouds - is the hierarchical or "fractal" structure extending down to AU-sized clumps such that significant amounts of mass may be hidden in the smallest, densest clumps? The globular cluster NGC 4833 lies behind dusty regions at a latitude of -8°, and provides an

ideal means of looking for small-scale time variations of the extinction. This globular cluster has already been observed by our team in 2006. Old observations of NGC 4833 have been reduced and are promising. It is particularly relevant to study photometric variations of stars due to variable reddening in the light of sight near of the galactic plane, because Gaia should be able to detect them.

P19 Mapping the “X-shaped Structure” in the Galactic Bulge

Zhao-Yu Li, Juntai Shen

Numerical simulation is essential in understanding and reconstructing the Galactic bulge from observations of numerous individual stars. We apply adaptive kernel smoothing method on three disk simulations to derive the spatial topological surfaces of the bar at different spatial densities. We find that the bar morphology varies at different radius after long time evolution to reach the mature stage. From the face-on view of the bar, the iso-density contours all have similar ellipticities, while in the edge-on view, the contour shape transients from a boxy component to a peanut component with an extended thin bar component. According to the topological results, we expect that in the Galactic bulge, lines of sight passing through the central boxy component ($|b| \leq 3^\degree$) should not reveal double density peaks. This is actually quite consistent with the observations that double peak features cannot be identified (or merge together) at $|b| \sim 3^\degree$. This central boxy component, which contains about 30\% bar mass, may have a non-negligible influence on the bulge measurement for barred galaxies. We also discuss the possible connection between the X-shape and the peanut component.

P20 Tomography of star-forming regions with VLBI radio interferometers

Laurent Loinard

Very Long Baseline Interferometry (VLBI) at radio wavelengths can currently provide astrometry accurate to better than a few tens of micro-arcseconds (i.e. comparable with GAIA) without being limited by dust obscuration. This implies that unlike GAIA, VLBI can be applied to star-forming regions independently of their internal and line-of-sight extinction. Low-mass young stellar objects (particularly T Tauri stars) are often non-thermal compact radio emitters, ideal for astrometric radio continuum experiments. Through VLBI observations of such active T Tauri stars in nearby regions (e.g.\ Taurus, Ophiuchus, or Orion), we have been able to start reconstructing both the regions' 3D structure (through parallax measurements) and their internal kinematics (through proper motions). Thus astrometric VLBI observations enables"tomography mapping" of star-forming regions. In this talk I will present the results that we have obtained so far, and discuss a large on-going VLBA project called "The Gould's Belt Distances Survey" that will extend these observations to dozens of young stars distributed across the most prominent nearby regions of star-formation.

P21 New solar twins and siblings in the ELODIE and SOPHIE archives

Mahdi D., Soubiran C., Blanco-Cuaresma S.

Solar twins were searched in the ELODIE and SOPHIE archives by matching spectra to solar ones and applying a minimum distance criterion. New very close solar twins never reported before were found. Solar siblings were also searched by looking at stars having the same abundances than the Sun. For that

purpose a purely differential method was applied on a line by line basis.

P22 GUASOM: Gaia Utility for Analysis and Knowledge Discovery based on Self Organizing Maps

D. Fustes, M. Manteiga, C. Dafonte, B.Arcay, , M.A. Álvarez, D.Garabato

We present a method for knowledge analysis in large astronomical spectrophotometric archives. The method is based on a type of unsupervised learning Artificial Neural Networks named Self-organizing maps (SOMs). SOMs are used to organize the information in clusters of objects, as homogeneously as possible according to their spectral energy distributions, and to project them onto a 2D grid where the data structure can be visualized. Our algorithm has been tested by means of simulated Gaia spectrophotometry, which is based on SDSS observations and theoretical spectral libraries covering a wide sample of astronomical objects. We demonstrate the usefulness of the method by analyzing the spectra that were rejected by the SDSS spectroscopic classification pipeline and thus classified as “UNKNOWN”.

P23 Metallicity Gradients through Disk Instabilities.

Inma Martinez-Valpuesta

Observations show a clear vertical metallicity gradient in the Galactic bulge, which is often taken as a signature of dissipative processes in the formation of a classical bulge. Various evidence shows, however, that the Milky Way is a barred galaxy with a boxy bulge representing the inner three-dimensional part of the bar. Here we show with a secular evolution N-body model that a boxy bulge formed through bar and buckling instabilities can show vertical metallicity gradients similar to the observed gradient if the initial axisymmetric disk had a comparable radial metallicity gradient. In this framework, the range of metallicities in bulge fields constrains the chemical structure of the Galactic disk at early times before bar formation. Our secular evolution model was previously shown to reproduce inner Galaxy star counts and we show here that it also has cylindrical rotation. We use it to predict a full mean metallicity map across the Galactic bulge from a simple metallicity model for the initial disk. This map shows a general outward gradient on the sky as well as longitudinal perspective asymmetries. We also briefly comment on interpreting metallicity gradient observations in external boxy bulges.

P24 El papel del campo magnético en la evolución galáctica.

Marco A. Martos

Vía simulaciones hidrodinámicas de la evolución de una galaxia como la Vía Láctea modelada en detalle en todas sus componentes, exploramos la respuesta del gas interestelar al disco, incluyendo barra y brazos espirales. Los parámetros principales son la velocidad de rotación del patrón acoplado barra-espiral, supuesto a rotar rígidamente, y la intensidad del campo magnético. Encontramos que, incluso para valores inferiores a los actualmente observados del campo en al galaxia, la evolución es completamente diferente a la puramente hidrodinámica, y resulta en una clara separación del disco denso central y una corona de gas diluido rotante en la periferia, así como estructura filamentaria y un nivel de turbulencia a gran escala que sólo aparece en la presencia del campo magnético.

P25 Gaia Mission App: developing a mobile application for science outreach

M. Clotet, E. Masana, et al.

Connecting with the public on a frequent basis is becoming increasingly important in science outreach. In view of the ubiquity of smart devices, mobile apps provide researchers with a new channel to reach out to the general public. However, this platforms are limited in many aspects including screen size, memory and processing power. Therefore, it is a challenge to take into consideration this limitations while providing the public with all the desired information. The Gaia Mission app provides information about the mission in an interactive, user-friendly and engaging way. The app features an interactive 3D model of the satellite and multimedia content and interactive parts designed to demonstrate complex concepts. The app also features live information and news about the mission progress to keep users engaged.
In light of the usage statistics of the application, just one year after it's first release, it has proven to be an effective way to do outreach. We managed to get thousands of downloads from more than
5 countries and maintain users interested.

P26 The Gaia Object Simulator

E. Antiche, R. Borrachero, F. Julbe, E. Masana

Gaia, a cornerstone ESA mission, will produce a three-dimensional map of our Galaxy. It was launched in December 2013, and it is expected to provide an important improvement in our understanding of the structure, composition and evolution of the Galaxy. The preparation for the acquisition of the data is essential as Gaia will provide astrometry, radial velocities and multi-colour photometry for over one billion objects in the sky. The Gaia Data Processing and Analysis Consortium (DPAC), has been preparing a simulator called the Gaia Object Generator (GOG), which simulates the end of mission catalogue, including observational errors. This is achieved through the use of analytical and numerical error models to create realistic observational errors in astrometric, photometric and spectroscopic parameters (Isasi et al. 2010). The GOG catalogue has provided useful information about the contents of the expected Gaia catalogue and moreover, is actively used to produce the tools that will validate, manipulate and visualize the real data before publication.

P27 Detectability of Ultra Faint Dwarf Galaxies with Gaia

Cecilia Mateu, Teresa Antoja, Luis Aguilar, Francesca Figueras, Anthony Brown, Antonio Aparicio, Sebastián Hidalgo, Fabiola Hernández Erika Antiche

It is clear that Gaia will play a crucial role in the identification and study of substructure in the Galactic Halo. In particular, providing a census of Milky Way satellite galaxies with well understood limits and completeness is of great importance to facilitate the comparison between the observed distribution and predictions from galaxy formation models. In this contribution we will present a technique we have developed for the detection of Ultra-Faint Dwarf Galaxies (UFDGs) in the Galactic Halo, using sky and proper motion information. The method consists in using wavelet transforms to detect peaks in the sky and proper motion planes, and evaluating the probability of these being stochastic fluctuations. Our main goal is to provide a thorough characterization of the detection limits of this technique. For this we have

produced a library of ~3000 synthetic UFDGs, embedded in the Gaia Universe Model Snapshot background, located at different distances with different luminosity, half-light radius, velocity dispersion and center-of-mass velocity varying in ranges that extend well beyond those spanned by known classical and ultra-faint dShps. We will present here the detection limits obtained as a function of different physical and observable parameters using these synthetic UFDGs as a benchmark.

P28 The IMF at intermediate masses from Galactic Cepheids

Mor R.; Robin A.; Lemasle B.; Figueras F.

Aims. To constrain the Initial Mass Function (IMF) of the Galactic young (< 1Gyr) thin Disc population using Cepheids. Methods. We have optimized the flexibility of the new Besanc¸on Galaxy Model (Czekaj et al., 2014) to simulate magnitude and distance complete samples of young intermediate mass stars assuming different IMFs and Star Formation Histories (SFH). Comparing the simulated synthetic catalogues with the observational data we studied which IMF reproduces better the observational number of Cepheids in the Galactic thin Disc. We analysed three different IMF: (1) Salpeter, (2) Kroupa-Haywood and (3) Haywood-Robin IMFs with a decreasing SFH from Aumer and Binney, 2009. Results. For the first time the Besanc¸on Galaxy Model is used to characterize the galactic Cepheids. We found that for most of the cases the Salpeter IMF overestimates the number of observed Cepheids and Haywood-Robin IMF underestimates it. The Kroupa-Haywood IMF, with a slope = 3.2, is the one that best reproduces the observed Cepheids. From the comparison of the predicted and observed number of Cepheids up to V=12, we point that the model might underestimate the scale height of the young population. Conclusions. In agreement with Kroupa and Weidner (2003) our study shows that the Salpeter IMF (= 2.35) overestimates the star counts in the range $4 \leq M/M_{\odot} \leq 10$ and supports the idea that the slope of the intermediate and massive stars IMF is steeper than the Salpeter IMF.

P29 The Milky Way: facts and fiction

M. Moreno

In 2001, ESA presented a study entitled "Innovative Technologies from Science-Fiction (SF) for Space Applications" (ITSF, ESA, 2001). The main objectives were to review the genre of SF (literature, artwork and films) "in order to identify and assess innovative technologies and concepts described therein which could possibly be developed further for space applications." SF are full of descriptions of space technologies and physical and astronomical concepts. Usually, authors describes space concepts based on the scientific knowledge available at the time. Often are pure imagination, sometimes based on some semblance of fact. Misconceptions and mistakes are also unfortunately habitual. For example, in the film Independence Day (1996) the hypothetical origin of the aliens is a planet that is beyond the limits of the known universe!: "They come from a world 90,000 million light years from Earth? Following the original idea of ESA's study, we focus on aspects related with our Galaxy not considered there. In this work certain concepts of the relationship, not very flowing, between the Milky Way and modern SF are analyzed: central black hole (The Black Hole, 1979); exoplanets (Star Wars saga, 1977-2005); the spiral structure and the edge of the galaxy (Star Trek: The Original Series, 1966-1969); stellar component (Avatar, 2009; The Big Bang Theory, TV sitcom, 2007); colonization of space (Elysium, 2013); Andromeda Galaxy

(A for Andromeda, 1961; District 9, 2009) and others.
At the same time that SF can be used to stimulate thoughts and ideas, the recent advances (Gaia mission) in the comprehension of our Galaxy can be incorporated as elements of fiction. In front of the growing interest of the citizens for the astronomy, it is palpable and notorious the persistence of certain astronomical illiteracy (Comins, 2001). Watching films and reading books can help the public not only to understand the advances and discoveries that the makers of fiction, such as scriptwriters, film directors and writers, incorporate into their works, but also to exercise a healthy skepticism and the ability to think critically.

P30 Radial migration and the properties of the MW disk

N. Prantzos and E. Athanassoula

I will present the results of a recent study on the impact of radial migration of stars on the chemical evolution of the Milky Way disk. In particular, assuming that the thick disk is the oldest (>9 Gyr) part of the disk, we find that the adopted radial migration scheme can reproduce quantitatively the main local properties of the thin and thick disk: metallicity distributions, "two-branch" behaviour in the O/Fe vs Fe/H relation, local surface densities of stars. We also show how, in this framework, current and forthcoming spectroscopic observations can constrain the nucleosynthesis yields of massive stars for the metallicity range of 0.1 Zsun to 2-3 Zsun**.**

P.31 Halo Streamers in the Era of Gaia

Re Fiorentin, P., Curir, A., Lattanzi, M.G., Spagna A.

The solar neighbourhood potentially contains a very large number of kinematic groups which are related to the various building blocks of the stellar halo. We explore a simulated inner halo based on a set of four high resolution N-body numerical simulations of the interaction between dwarf galaxies and the Milky Way. We analyse the kinematics and orbital properties of these simulations in order to investigate and characterise the possibly detectable signatures that remain in phase-space. In addition, we investigate the impact of observational errors in our simulations, and compare the current picture to the promising prospect of highly improved data expected from the Gaia mission.

P32 Novel kinematic methods to trace Spiral Arms nature using Gaia data

S. Roca-Fàbrega, F. Figueras, O. Valenzuela, M. Romero-Gómez, T.Antoja and B. Pichardo

In this work we shed new light in the nature of spiral arm structures in galaxies. We present a disk kinematic and dynamic study of MW like galaxies using complementary approaches: analytical models, test-particle simulations and pure N-body simulations. Using collisionless N-body data we found that models with strong bar present a flat rotation frequency, i.e. rigid body rotation, whereas in the opposite extreme case, i.e. in unbarred systems, spiral arms are disk corotant. Complementary to this work, we discuss how the vertex deviation parameter is getting a good tracer of corotation (CR) and outer Lindblad resonance radius (OLR). Gaia post-launch performances are being used to map the radial an azimuthally variation of this parameter and the spiral arm rotation frequency, all through the galactic disk to be observed by Gaia. We have succeed to produce MW like models in fully cosmological N-body plus hydrodynamic simulations with a high

resolution. First results concerning disk phase space properties in terms of spiral arm nature using these simulations will be also discussed.

P33 Characterisation of the Gaia Red Clump

L. Ruiz-Dern

The Red Clump is a compact group of stars located in the giant branch which are burning helium in their core. They are known to have an absolute magnitude that fairly weakly depends on their age and metallicity, a peculiarity which makes them good distance indicators. Gaia will provide high precision astrometry, photometry and spectroscopy for a billion stars, allowing a very accurate characterisation of the properties of the Red Clump and a new calibration of this standard candle.
We are currently developping our method to calibrate the Red Clump on the Hipparcos catalogue, adding photometry from the Mermilliod and 2MASS catalogues, to cover wavelengths from the ultraviolet to the near-infrared. The calibration is being done by using the Padova isochrones and taking into account the extinction, the metallicity and the age factors. With the first release of the Gaia catalogue we will be able to give the Gaia G band calibration of the Red Clump.

P34 Estimating Gaia's performance for O stars in the Outer Galactic Plane using Herschel data

K.L.J. Rygl, S. Molinari, T. Prusti, T. Antoja, D. Elia, J. de Bruijne

It is in the less dense Outer Galaxy where Gaia can contribute much to stellar studies of the Galactic Plane. Using Herschel column density maps of the Galactic Plane we estimate the extinction in the Outer Galaxy and derive the farthest accurate Gaia astrometry for O-stars. As O stars are by definition young (~Myr) objects their positions and kinematics can still be related to their formation site and history. Thus, the Gaia O star astrometry will be not only important for studies of high-mass star formation, but also an interesting complement to the radio maser astrometry of star-forming regions. We find that the Outer Galaxy extinction is such that Gaia astrometry will be able to transgress the Perseus arm.

P35 Origin of the metallicity distribution in the thick disc

Maider Sancho Miranda, Bradley Gibson, Kate Pilkington, Christopher Brook, Patricia Sanchez-Blazquez

We examine how both the radial and vertical metallicity gradients change as a function of distance from the galactic plane and radius, along with an analysis of the stellar rotational velocities. We use a suite of chemo-dynamical simulations, realised as part of the MAking Galaxies In a Cosmological Context (MaGICC) project, the McMaster Unbiased Galaxy Survey (MUGS) and one galaxy using the Ramses-CH code. The galaxies span a range of masses, feedback prescriptions and initial conditions/assembly history. Our work reveals the radial metallicity gradients of the kinematically-defined disc stars to be negative in the mid-plane of the simulated discs but when we reach ~1 kpc above the plane the radial gradients become inverted (i.e. more metal-rich in the outskirts, relative to the inner parts of their respective discs). Such behaviour is consistent with that inferred from observational data (e.g. Cheng et al 2012; Carrell et al 2012). Our measurements of the vertical metallicity gradients show no clear correlation between them and distance from the galactic centre, but do find values of vertical gradients to be in good agreement with observations. Each of the simulations shows a decline in

rotational velocity with increasing height from the plane of the galaxy. However, only one simulation shows a decline of similar a amount to observations of the Milky Way (e.g. Moni Bidin et al 2012). We make an exhaustive study to simulations to explain all these observational trends.

P36 The formation of the Milky Way bulge and its X-shaped structure

Juntai Shen & Zhao-Yu Li

Bulges are commonly believed to form in the dynamical violence of galaxy collisions and mergers. We model the stellar kinematics of the Bulge Radial Velocity Assay (BRAVA) and find no sign that the Milky Way contains a classical bulge formed by scrambling pre-existing disks of stars in major mergers. Rather, the bulge appears to be a bar seen somewhat end-on, as hinted from its asymmetric boxy shape. We construct a simple but realistic N-body model of the Galaxy that self-consistently develops a bar. The bar immediately buckles and thickens in the vertical direction. As seen from the Sun, the result resembles the boxy bulge of our Galaxy. The model fits the BRAVA stellar kinematic data covering the whole bulge strikingly well with no need for a merger-made classical bulge. Our model also contains an intriguing vertical X-shaped structure that resembles the similar structure reported recently in the Galactic bulge. We explore the 3D structure of the X shape with models of different buckling amplitudes.The existence of the vertical X-shaped structure also suggests that the formation of the Milky Way bulge is shaped mainly by internal disk dynamical instabilities.

P37 Peering through the dust: Precise astrometry of the Galactic mid-plane with the VVV survey.

Leigh Smith, Philip Lucas, Hugh Jones

Gaia will see little of the Galactic mid-plane and nuclear bulge due to high extinction at optical wavelengths. To study the structure and kinematics of the inner Galaxy we must look at longer wavelengths. The Vista Variables in the Via Lactea (VVV) survey currently provides just over 4 years of observations covering approximately 560 square degrees of the Galactic bulge and plane. Typically each source is observed 50-150 times in the Ks band over this period. Using these data we provide relative proper motions for approximately 200 million unique sources down to Ks~16 with uncertainties approaching 1mas/yr. In addition, we fit a solution of the parallactic motion of all sources with significant proper motion. These results will allow us to identify faint common proper motion companions to Gaia's discoveries, increasing the number of low mass benchmark objects. We describe how the Gaia absolute astrometric reference grid will allow us anchor our results and measure the streaming motions of stars in the bulge. Finally, we illustrate how the catalogue can be used to kinematically investigate the nature of the numerous optically invisible high amplitude variable stars that VVV is discovering.

P38 VOSA: SED building and analysis of thousands of stars in the framework of Gaia

Enrique Solano, Carlos Rodrigo, Amelia Bayo

VOSA(VOSedAnalyzer, ttp://svo2.cab.inta-csic.es/theory/vosa/) is a web-based tool designed to combine private photometric measurements with data available in VO services distributed worldwide to build the observational spectral energy distributions (SEDs) of hundreds of objects. VOSA also accesses various collections of models to simulate the equivalent theoretical SEDs, allows the user to decide the range of

physical parameters to explore, performs the SED comparison, provides the best fitting models to the user following two different approaches (chi square and Bayesian fitting), and, for stellar sources, compares these parameters with isochrones and evolutionary tracks to estimate masses and ages.In particular, VOSA offers the advantage of deriving physical parameters using all the available photometric information instead of a restricted subset of colors. VOSA was firstly released in 2008 and its functionalities are described in Bayo et al. (2008,A&A 492, 277). At the time of writing this proposalthere are more than 300 active users in VOSA who have published more than 50 refereed papers. In the framework of the GENIUS (https://gaia.am.ub.es/Twiki/bin/view/GENIUS) project we are upgrading VOSA to, on one hand, provide a seamless access to Gaia data and, on the other hand, handle thousands of objects at a time. In this poster, the main functionalities to be implemented in the Gaia context will be described.

P39 On the connection between the thick disk and the barred galactic bulge

Alessandro Spagna, Anna Curir, Mario G. Lattanzi, Paola Re Fiorentin, Ana Laura Serra

Although the thick disk in our Galaxy was revealed more than thirty years ago, the formation scenario is still unclear.
Recently, several studies of in-situ thick disk stars have evidenced a positive kinematic-metallicity correlation, dVphi/d[Fe/H] = 40-50 km/s/dex. Such a finding appears consistent with a mild positive radial metallicity gradient, d[Fe/H]/dR, for thick disk stars, which, differently from thin disk stars, show lower chemical abundances towards the inner disk. Here, we discuss these results with respect to the expected evolution of a primordial disk population, as deduced through high resolution N-body simulations of a Milky Way-like disk galaxy. In particular, we analyse how the presence of a barred bulge may affect the disk evolution from the spatial and chemo-kinematical point of view.

P40 Precise spectroscopic parameters for solar-type stars with moderate-to-high rotation

Maria Tsantaki

One of the primary objectives of Gaia is to survey billions stars in our Galaxy and build the most precise 3D map of the Milky Way. Automated techniques of spectral analysis are needed to perform a rapid and homogeneous processing of the data with the goal to provide precise and accurate stellar parameters (GAIA-ESO survey). In this context, I will present my recent work on the determination of precise and accurate stellar parameters for FGK stars (Tsantaki et al., 2014). This work is based on the spectral synthesis technique designed to derive parameters for both slowly and fast rotating stars, using the package 'Spectroscopy Made Easy'. We show that our results are on the same scale as the parameters derived from the iron ionization and excitation method. With both techniques, we are able to derive parameters for a very wide group of stars: from giants to dwarfs and from slowly to fast rotating stars. Except for galactic studies, stellar parameters are important for planet searches. Our results have a strong impact on the precise stellar and planetary characterization. We provide updated results for planet-host stars compiled in the catalogue SWEET-Cat.