Gaia-ESO Survey Science Projects

Lista de proyectos que hayan sido propuestos y/o en donde estemos interesados algún grupo español, más algunos proyectos interesantes dentro del GES.

A) Section LOCAL FIELD DWARFS (UVES PARALLELS)

1A.- Project: Lithium in the Galactic disc(s)

Proposers: Carine Babusiaux, Katia Biazzo, Piercarlo Bonifacio, Elisabetta Caffau, Patrick François, Ana Goméz, Jonay González Hernández, Vanessa Hill, David Katz, Andreas Koch, Hans-Gunter Ludwig, Lorenzo Monaco, Alessio Mucciarelli, Elena Pancino, Luca Pasquini, Sofia Randich, Frédéric Royer, Rodolfo Smiljanic, Matthias Steffen, Alejandra Recio-Blanco, Patrick de Laverny, Sérgio Sousa, Nuno C. Santos, Elisa Delgado-Mena, Vardan Adibekyan

Abstract: This project aims at using all the UVES observations of nearby F-G dwarfs in the first 4-5 runs to study the lithium abundance in the Galactic discs. Most stars are expected to belong to the thin disc, some will be thick disc, a few will also be Halo objects. Even assembling only the data from the first four or five runs this sample will likely be one of the largest of this kind. Methods: atmospheric parameters will be adopted from the Gaia-ESO data analysis pipeline. Effective temperatures will be checked also using the wings of Halpha. The lithium abundances will be derived using spectrum synthesis and line profile fitting. NLTE and 3D effects will be taken into account. The goal is to submit a paper by the end of 2012.

2A.- Project: Chromospheric activity of late-type stars in the solar neighborhood

Proposers: B. Stelzer, J. Lopez-Santiago, J. Alcala, K. Biazzo, D. Montes, G. Pace

Abstract: We will carry out a comprehensive analysis of prominent emission lines of nearby FGK stars making use of GIRAFFE and UVES data. Specifically, we aim at determining flux-flux relations between pairs of lines, e.g. between Halpha and the Ca IR triplet, to quantify the relative radiative losses in different parts of stellar chromospheres. The large number of FGK stars to be observed within GES will increase the sample statistics by about a factor 20 with respect to previous studies and allow us to examine the dependence of the flux-flux relations on spectral type and other stellar parameters, as well as on binarity and overall activity level.

B) Section THIN DISK KINEMATICS

1B.- Project: Stellar associations and moving groups: young field stars in the solar neighborhood.

Proposers: Javier López-Santiago, David Montes, Giusi Micela, Laura Affer, Beate Stelzer

Abstract: The Gaia ESO Survey will produce a large amount of data from field stars, not only from specific pointed observations but also in cluster fields. The Galactic Besancon model predicts more than a hundred field late-type stars in an area of 2x2 sq. deg, in the line of sight of a cluster in the Galactic plane at a typical distance of 300 pc. Many of these field stars have been likely selected as cluster candidates and will be observed with GIRAFFE. We aim to look for possible nearby young stars in the samples of discarded candidates among the stars observed in cluster fields. The division between young and old stars will be performed in base of their Halpha emission and lithium abundance. Radial velocities determined for those stars will be used to calculate their space motion. A study on their possible membership in any young stellar association or moving group will be carried out. (Overlaps with Cluster-Field Analyses).

Interested in joining: Alexis Klutsch, José A. Caballero, Antonio Frasca, Sergio Messina, Hugo Tabernero, Jonay González-Hernández

2B.- Project: Kinematic substructure in the disc of the Milky Way

Proposers: Teresa Antoja, Amina Helmi

Abstract: The bar and the spiral arms of our Galaxy influence the orbits of disc stars through mechanisms like resonant trapping/scattering, which can create velocity substructure in several positions of the disc. For instance, the Solar neighbourhood is full of kinematic groups that are imprints of these and other processes. Simulations have shown that this kinematic substructure depends on some properties of the spiral arms and the bar that could, therefore, be derived through comparison to observations. Simulations also show that distributions of radial velocity alone can show peaks related to these kinematic groups, specially in particular directions. The Gaia ESO Survey will obtain a large amount of radial velocities in several fields in the Galactic plane that will be of great interested for this study. For instance, approximately 10000 RC stars will be observed in a field around l=-85 and b~0 deg, with distances that range from ~ 2-4 to 8-10 kpc. We plan to analyse distributions of radial velocity in these fields in search for kinematic substructure that we can relate to the effects of the bar or the spiral arms, or to other processes like clusters that are being disrupted.

Interested in joining: Caroline Soubiran, Sofia Feltzing, David Montes

3B.- Project: Searching for new members of stellar kinematic groups: kine-chemical tagging FGK stars with GES/UVES data

Proposers: David Montes, Hugo Tabernero, Jonay González Hernández

Abstract: Using the large amount of data provided by the Gaia ESO Survey (GES) we intend to perform a chemical and kinematic analysis of the FGK field stars of the Milky Way observed with UVES. Using the radial velocities provided by the survey, the astrometry available in the literature and an estimation of the distance using our derived spectroscopic stellar parameters (Teff, log g, [Fe/H]) we will make a first kinematic selection of possible members to stellar kinematic groups (moving groups and associations) of difference ages. For these subsamples of stars we will perform a detailed differential abundance analysis (chemical tagging) and use additional information derived from the spectra (rotational velocities, Lithium abundance and chromospheric activity) that will allowed us to discern between real physical structures of coeval stars with a common origin (debris of star-forming aggregates in the disk) and field-like stars (structures formed by resonance interactions, associated with dynamical resonances (bar) or spiral structure).

Interested in joining: Alexis Klutsch

**NOTE**: there is other project "**Searching for ex-Omega Cen members among solar neighbourhood stars**" proposed by E. Pancino, D. Romano & M. Bellazzini that could partially overlap with it.

C) Section CALIBRATION AND STANDARDS

1C.- Project: Intra- and inter-survey links via Benchmark stars

Proposers: Ulrike Heiter, Paula Jofré and LUMBA

Abstract: The Gaia-ESO survey is expected to achieve high internal accuracy in terms of stellar parameters, abundances, and radial velocities. These will enable us to investigate a number of science cases which rely on samples of stars observed within the survey. However, if complementary samples of stars are required, either combining UVES and GIRAFFE data within GES or from other surveys in addition to the GES, a link needs to be established, to bring the quantities measured from different spectra with different methods onto the same scale. We propose to address this issue by analysing different observations (GES-UVES, GES-GIRAFFE, and other ground-based

data) for a set of benchmark stars with the method developed by the LUMBA node, and methods used by other WG10/WG11 nodes. The results will be compared and can be used to calibrate analyses of combined stellar samples. The project is related to the project *Masses and ages of FGK stars* in category *Stellar evolution*.

Interested in joining: E. Pancino (Bologna), L. Magrini (Arcetri-ESO), G. Sacco (for the RVs), J. Sobeck (Nice), Clare Worley (Nice), A. Bragaglia (Bologna), A. Vallenari, R.Sordo (Padova), A. Recio-Blanco, P. de Laverny, D. Montes (UCM), H.M. Tabernero (UCM), N. Ryde (Lund), T. Bensby (Lund), S. Sousa (Porto/CAUP)

2C.- Project: A calibration of B spectral types

Proposers: Ignacio Negueruela (Alicante), Sergio Simón-Díaz (IAC), Norberto Castro (Bonn)

Abstract: The temperature scale for B-type stars is very poorly established, partly because of the many chemically peculiar stars. Several attempts at providing temperature calibrations for O-type stars resulted in large gaps and inconsistencies in the B0-B2 spectral range. Though several papers have addressed the temperature scale of B-type supergiants using modern stellar atmosphere models, a similar effort for lower-luminosity B stars is still lacking. We intend to use all the B-type stars observed in the GES sample of young massive clusters to provide a temperature scale for B-type giants and main-sequence stars via model fitting with grids of synthetic spectra generated with the FASTWIND code. This project may require additional observations to provide classification (i.e., covering the 3950-4750A range at R~4000) spectra for the stars.

Interested in joining: Jesús Maíz Apellániz (IAA-CSIC) , Ronny Blomme (Belgium)

3C.- Project: Photometric metallicity calibrations revisited with Gaia-ESO survey

Proposers: Carme Jordi, L. Balaguer-Núñez (UB-ICC/IEEC)

Abstract: The m1 index of the Strömgren photometric system is an indicator of the [Fe/H] content of stars. The aim of the project is to analyse the [Fe/H] vs m1 relationship with the data acquired with UVES and GIRAFFE, and update the current realtionships, if needed. Residuals of the calibration as a function of [alpha/Fe] will also be studied.

D) Section CLUSTER MEMBERSHIP

1D.- Project: Comparison of different technical methods for membership in the young cluster Gamma 2 Velorum

Proposers: L. Prisinzano, F. Damiani, G. Micela (INAF-OAPa), Germano Sacco, Elena Franciosini (INAF-Arcetri), Antonio Frasca (INAF-Catania), Alessandro Lanzafame, Rosaria Bonito (UNIPA-INAF-OAPa)

Abstract: With the Gaia-ESO Survey we will have spatially complete sets of radial velocities and lithium abundances of cluster populations within the magnitude (and therefore mass) limit imposed by the Survey. Starting from data of Gamma 2 Velorum cluster, we want to compare limits and efficiency of different methods usually adopted to select cluster members such as X-ray data, lithium abundance, IR excesses, Halpha line and proper motions. This analysis will produce an 'unbiased' member catalog that will be used to estimate the initial mass function and the total mass of the Gamma 2 Velorum cluster by using a spatially and photometric complete sample of confirmed cluster members down to the mass limit of 0.2 solar masses. The data will be used also to derive the the frequency of objects with circumstellar disks and accretors. (Overlaps with Stellar Evolution and Technical Methods).

Comment by E. J. Alfaro. At IAA we are developing new codes for cluster membership analysis, thus, we would like to join this project in order to compare the methodologies designed in pour group with those proposed and developed by other groups belonging to the consortium.

Interested in joining: Emilio J. Alfaro, Mayte Costado

2D.- Project: Membership and dynamics of the Chamaeleon I star forming region

Proposers: Germano Sacco, Lorenzo Spina, Francesco Palla, Timo Prusti, Antonio Frasca (INAF-Catania), M. Cottaar, M. Meyer (ETH Zurich)

Abstract: Chamaeleon I is a very young (~2 Myr) and close (d~160 pc) cluster composed of about 240 stellar members associated with a molecular cloud that is still forming stars. Due to its favorable properties is one of the most interesting regions for studying the dynamical evolution of young clusters of small size, during the first phases of the star formation process when a significant amount of interstellar gas is still present. The observations of the Cha I cluster have been completed during the run P89_F. We plan to use the radial velocities and the information on membership provided by the GAIA-ESO survey for investigating the star formation history and the

dynamical status of the cluster, and for better understanding the role played by the interstellar gas in the earliest phases of the cluster evolution. There is an overlap with cluster membership.

Interested in joining: Emilio J. Alfaro

3D.- Project: Chromospheric activity, rotation, and membership in the young cluster Gamma 2 Velorum

Proposers: A. Frasca, A. C. Lanzafame, E. Brugaletta, S. Messina (INAF-Catania), K. Biazzo, J.M. Alcalá, E. Covino (INAF-Napoli)

Abstract: The GES observations of the Gamma 2 Vel association (age ~ 10 Myr) will be of great importance for selecting members to the association through different methods: essentially RV, proper motions, and lithium abundance. The presence of emission or filling in the H-alpha line can be used as an additional criterion for membership. It is also important to measure the net chromospheric emission and to study its distribution as a function of the star properties (basically Teff and Mass). For this task, codes such as ROTFIT, which is able to measure the atmospheric parameters, vsini, and the net H-alpha emission by means of the subtraction technique, are very useful. These data, together to those of stars in clusters of different ages, which will be observed by the GES, will enable us to trace the evolution of magnetic activity with age. A similar study on the distribution of projected rotational velocities will be performed in parallel to the chromospheric emission.

Interested in joining: David Montes, Emilio J. Alfaro

4D.- Project: Membership analysis of GES clusters based on GES data only

Proposers: Emilio J. Alfaro, Mayte Costado, Laura Sampedro (IAA-CSIC; WG1)

Abstract: WG1, 2 and 4, have had the responsibility of drawing a list of cluster star candidates to tailor the final OB files. The main characteristics of GES program suggested a flexible criterion when selecting the target candidates but accomplishing three basic rules: Homogeneity, Simplicity and Completeness. In particular, only those stars that given their position in the colour-magnitude diagram, or their kinematics are considered outliers of star distribution in the cluster have been pruned. Although this criterion entails the possible inclusion of field stars, the final list will be more in line with the general objectives of the project and its character as a legacy program.

Now, after the first data have been released, we would like to check how close to our aim we have been, checking the cluster membership with data coming from

the own project only, i.e. with the results provided by GES for radial velocity and metallicity of the target stars.

In this way we would perform a quality control of our own procedure, which would be of help for next observational programs and a good appendix to be added to the final GES report. People involved in the target selection task are enthusiastically invited to participate in this project.

E) Section CLUSTERS KINEMATICS

1E = 2D.- Project: Membership and dynamics of the Chamaeleon I star forming region

F) Section CLUSTERS ABUNDANCES

1F.- Project: Abundances ratios in Gamma Velorum

Proposers: Laura Affer, Loredana Prisinzano, Giusi Micela, D. Montes

Abstract: The aim of this project is to study the formation history of the γ Velorum association from the abundances ratios of its stars. As Jeffries et al. (2009) pointed out, the γ Velorum association presumably consists of several star-forming sites, since the velocity dispersion of pre-main sequence stars is too low to account for its wide extent as a consequence of a single star-forming event. One possible explanation is that star formation could progress in a sequential fashion. This sequential formation could be revealed by differences in abundances which are key indicators of which "formation stage" the stars belong to, and should also enable us to identify the mechanisms which could have triggered these star-formation events. We will study the abundance distribution derived by UVES spectra of several stars, which have been selected within the field of view studied by Jeffries et al. (2009). We are evaluating the opportunity of performing the same analysis on FLAMES data.

Interested in joining: Rob Jeffries

2F.- Project: Chemical tagging of young clusters and associations

Proposers: Lorenzo Spina, Sofia Randich, Francesco Palla, Laura Magrini

Abstract: Metallicity and abundance determinations in young nearby clusters provide a tool to investigate cluster [common] origin and formation scenarios, chemical evolution of the solar neighborhood, as well as the relationship between metallicity and circumstellar and debris disc evolution (e.g., Biazzo, Randich et al. 2011, A&A 530, 19; Randich 2010, jena.confE.210R; D'Orazi & Randich 2009, A&A 501, 553). We plan to use iron and other element abundances of confirmed young cluster members observed by the Gaia-ESO Survey to address these issues. We will start with Gamma 2 Velorum that, due to its age, location (within a large region rich in clusters of different ages), and apparently low frequency of circumstellar discs, represents a very interesting case. The second case will be Chamaeleon I: a younger cluster divided in two subclusters with different star forming histories (Luhman 2007). Being Gamma 2 Velorum and Chamaeleon I the first pre-main sequence clusters observed by the Gaia-ESO Survey, analysis of elemental abundance results and uncertainties will also allow science verification to be performed.

Interested in joining: Katia Biazzo, David Montes, Hugo M. Tabernero, Jonay I. González Hernández, A. Vallenari, P. Sestito, Emilio J. Alfaro

3F.- Project: Testing the chemical tagging with old OCs

Proposers: Sergi Blanco, Caroline Soubiran, Paula Jofre and the LUMBA group

Abstract: 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. We propose to look at the abundance patterns of all possible elements in old OCs as soon as we will have sufficient high quality UVES data for them. We will evaluate the internal abundance spread in those targets and see whether different signatures are measureable among them.

Interested in joining: Angela Bragaglia, Laura Magrini, Eileen Friel, E. Pancino, A. Vallenari, David Montes, Hugo M. Tabernero, Jonay I. González Hernández, Grazina Tautvaisiene, Sarunas Mikolaitis, Emilio J. Alfaro, Concepcion Node (Geisler, Villanova, San Roman), Rodolfo Smiljanic

4F.- Project: The chemical composition of Trumpler 20 and of the Carina and Scutum-Crux arms

Proposers: Laura Magrini, Angela Bragaglia, Heather Jacobson, Eileen Friel

Abstract: Trumpler 20 is a rich open star cluster which is expected to be heavily

contaminated by field stars since it lies inside the solar ring, in the inter-arm region between Carina and Scutum-Crux. The line of sight to the cluster crosses at least once a spiral arm. This will allow us to study not only the cluster population but also the stellar population belonging to the spiral arm between us and Tr20. With a proper membership analysis we will be able to discriminate the two populations and to investigate if there are differences in terms of chemical abundances and abundance ratios. We propose to use stellar parameters and abundancesfrom the Gaia-ESO Survey for member and non member stars of Tr20 to study both the cluster and spiral arm populations.

Interested in joining: Antonella Vallenari, Emilio J. Alfaro, Paola Sestito, Paula Jofre, Rodolfo Smiljanic, Ulrike Heiter, Paolo Donati, Tristan Cantat, R.Sordo

5F.- Project: Characterization of the contaminant population in young clusters

Proposers: Lorenzo Spina and Arcetri group

Abstract: Besides confirmed cluster members, the samples of young cluster stars observed with UVES may contain a fraction of non-members, or contaminants. We aim to characterize the properties of these contaminant stars in young clusters, investigating their main stellar parameters including metallicity, Li abundances and radial velocities. We are going to perform this analysis on the samples selected for the first the two young clusters for which observations were completed: Gamma 2 Velorum and Chamaeleon I.

Interested in joining: David Montes

6F.- Project: Looking for multiple stellar populations in the massive cluster M11

Proposers: A. Vallenari, A. Bragaglia

Abstract: Multiple stellar populations have recently been found in globular clusters. Several observational evidences seem to suggest that self-pollution is active in massive clusters. Recently chemical dishomogenity have been detected in a massive open cluster, NGC 6791, even if this is still object of discussion. In this scenario, several points remain to be properly understood, in particular the nature of the polluters producing the abundance pattern in the clusters, the mass range where self-pollution can be active. M11 is a very massive object (M> 11,000 Mo) and it is a suitable candidate for multiple population detection. We propose to investigate chemical dishomegenities in this object, using the large sample of UVES spectra from which all the elements usually involved in the correlations and anti-correlations in massive

clusters can be detected.

Interested in joining: G. Tautvaisiene, A. Drazdauskas, E. Puzeras, Eileen Friel, Laura Magrini, Concepcion Node (Geisler, Villanova, San Roman), Rodolfo Smiljanic, Paolo Donati, Tristan Cantat, R. Sordo, C. Jordi, L. Balaguer-Núñez, Carmela Lardo

7F.- Project: Membership and kinematic analysis of M11

Proposers: Emilio J. Alfaro, Mayte Costado

Abstract: NGC6705 is an excellent candidate for the analysis of the evolution of clusters in the galactic disk in phase space. Its high mass, with an estimated value greater than 10^4 solar masses (Santos et al. 2005), its high density (Santos et al. 2005) and high spatial concentration (Sánchez & Alfaro 2009), the fact that proper motion data from different general and individual catalogues is available, an age of a few hundred million years, and the radial velocity data provided by GES, all make it possible to perform: a) A careful study of the cluster's star membership. b) A robust determination of the cluster velocity in 3D. c) The analysis of the dependence of the velocity dispersion on the cluster radius and star mass.

Interested in joining: A. Vallenari, R. Blomme, C. Jordi, L. Balaguer-Núñez

8F.- Project: Checking the metallicities determination on high resolution spectra for an open cluster (e.g. M67)

Proposers: Nuno Santos, and the Porto Node

Abstract: This project aims to derive the metallicities for the high resolution spectra available for an open cluster (e.g. M67). The main goal of this work is to derive the metallicity for the different types of stars belonging to the cluster, which should intrinsically have the same metallicity, and check if there is significant differences that may be due to the analysis process. In several previous works done by different authors, it is normally found an offset of the derived metallicities between the dwarf stars and the giant stars. This inconsistency is normally assigned to the method used to derive the spectroscopic parameters, which should be more specifically related with the linelist used. The linelist is normally compiled to be used on dwarf stars, and can be not optimal to be used in giant stars. The spectra taken for stars belonging to an open cluster can be used to test the methods within the GAIA-ESO Survey once assuming that the stars from the cluster should have the same metallicity.

Interested in joining: Paula Jofre, UCM Node, Laura Magrini, Antonella Vallenari, Tristan Cantat, R. Sordo, Eileen Friel.

G) Section STELLAR EVOLUTION

1G = 1D.- Project: Comparison of different technical methods for membership in the young cluster Gamma 2 Velorum

2G.- Project: Spectral classification of O stars in the Carina Nebula and beyond

Proposers: Jesús Maíz Apellániz (IAA-CSIC)

Abstract: The Carina Nebula is the low-extinction Galactic region with the largest number of O stars and the best sampling across the different spectral subtypes (e.g. it contains the only known Galactic example of the earliest subtype, O2). At the same time, its location on the tangent of a spiral arm superimposes populations over many kpc, thus complicating the analysis of the association membership. Gaia-ESO will provide blue-violet spectra of over a hundred O stars in that region of the sky. Combining spectral classification with the Bayesian photometry package CHORIZOS we will disentangle the 3-D location of the O stars, determining which ones are really physically associated with the Carina Nebula and which ones lie beyond.

Interested in joining: R. Blomme, Ignacio Negueruela

H) Section CLUSTER-FIELD ANALYSIS

1H = 1B.- Project: Stellar associations and moving groups: young field stars in the solar neighborhood.

2H.- Project: High-velocity stars interacting with the interstellar medium

Proposers: J. Lopez-Santiago (UCM, Spain), R. Bonito (UNIPA - OAPa, Italy)

Abstract: The GES survey will detect many halo stars and possibly runaway stars passing through interstellar medium at high velocity, particularly in star-forming regions such as Cha I. The interaction of those stars with the medium could produce supersonic shocks, as in the case of AE Aur (Lopez-Santiago et al. 2012). The study of

these (bow) socks can yield constraints to the physical conditions present in those particular regions. A selection of candidates for this study may be performed using the radial velocities determined by the GES **(overlaps with Any Other Projects)**.

3H.- Project: IRFM temperatures of field and cluster stars with GES/UVES data

Proposers: Jonay I. González Hernández (IAC, Spain), Hugo M. Tabernero (UCM, Spain), David Montes (UCM, Spain)

Abstract: We intend to apply the infrared flux method (IRFM) to MW field and cluster stars observed with UVES. We will derive IRFM-based effective temperatures, Teff, and compare them to Teff values derived using the EW-based method, which applies the excitation and ionization equilibria of Fe from the EWs of FeI-II lines (Tabernero et al. 2012). For MW field stars, we will start from the 2MASS JHKs magnitudes to derive IRFM Teff, in particular, using the colour (J-Ks). The reddenings E(B-V) will be determined from Schlegel et al. (1998) maps and we will apply the Teff:colour-[Fe/H] calibrations for dwarfs and giants given in González Hernández et al. (2009). For some stellar clusters and some field stars, for which APASS-Johnson V magnitudes are available, we will investigate the possibility to directly apply the IRFM to derive effective temperatures. In general, we will compare IRFM-based temperatures with EW-based temperatures for MW field and cluster stars at different metallicities **.**

Interested in joining: Maria Bergemann

I) Section TECHNICAL AND METHODS

1I = 1G = 1D.- Project: Comparison of different technical methods for membership in the young cluster Gamma 2 Velorum

2I = 2F.- Project: Chemical tagging of young clusters and associations

3I = 4D.- Project: Membership analysis of GES clusters based on GES data only

Otros proyectos interesantes dentro del GES

E) Section CLUSTERS MEMBERSHIP

1E.- Project: The Eagle Nebula population: selection and classification of cluster members

Proposers: R. Bonito (INAF-OAPA); M. G. Guarcello (SAO); G. Micela (INAF-OAPA); L. Prisinzano (INAF-OAPA)

Abstract: The Eagle Nebula (M16) is an important star-forming region at a distance of about 1750 pc from the Sun. In the last decades, studies of this region revealed a rich stellar population with massive and evolved stars, ClassII and ClassIII low-mass members and contracting protostars. This heterogeneous sample of stars offers a great opportunity to infer several facets of the star formation process and the influence of the environment. It is important, then, to achieve a reliable selection and detailed classification of the stars associated with M16. We will analyze GES observations, which cover both the central core of the nebula with NGC6611 and the outer parts, together with existing classifications based on X-rays and optical-infrared data, to classify and analyze its stellar population thanks to criteria based on radial velocity, the morphology of the Halpha line and the presence of the Lithium line.

2E.- Project: Membership and evolutionary status of low-mass PMS stars in NGC2264

Proposers: F.Damiani and the Palermo group

Abstract: We propose a study of membership indicators, including RVs, Li abundance, H-alpha emission, gravity indicators, for NGC2264 PMS stars, using new data (UVES and Giraffe) from GES. Also existing X-ray and Spitzer IR data for this cluster will be used as relevant additional membership indicators, as well a CoRoT data to better constraing stellar dynamical properties, which were already studied extensively by our Palermo group. On the basis of a solid member list, the evolutionary stage of cluster stars will be studied, based on indicators such as H-alpha, Lithium, possibly spectroscopic gravity, and a comparison of newly derived stellar fundamental parameters (Teff, Lbol) with evolutionary tracks. The optical and IR data will also allow a study of circumstellar disk frequency and evolution. Since the cluster morphology is highly structured, the dynamics and evolutionary stage of different sub-clusters will be investigated. Moreover, NGC2264 is one of the nearest GES clusters containing a wide mass spectrum, from O-type to M-type stars, enabling to study the interplay between massive- and low-mass star formation events in detail. (Overlaps with stellar evolution)

F) Section CLUSTERS ABUNDANCES

1F.- Project: Lithium abundances in young clusters

Proposers: Germano Sacco, Elena Franciosini, Francesco Palla, Sofia Randich, Katia Biazzo, Alessandro Lanzafame, Rosaria Bonito, Loredana Prisinzano

Abstract: Lithium abundance is a powerful tool to investigate young stellar evolution by probing the internal structure of PMS solar-type stars, and age spread in young clusters by providing an independent estimation of age. We would like to use Li abundances provided by GES to investigate these issues in young clusters and associations, starting from Gamma Velorum, that has been observed in previous runs and due to its age (5-10 Myr) is the ideal cluster for this project.

Interested in joining: Paola Sestito, Rodolfo Smiljanic, Giancarlo Pace

2F.- Project: The evolution of lithium depletion in open clusters

Proposers: Elena Franciosini and the Arcetri group

Abstract: The study of Li abundances in open clusters is very important to understand the evolution of Li depletion with age, metallicity and stellar mass and to constrain non-standard models of stellar evolution. Currently available data have shown a complex pattern of Li depletion on the main-sequence that is not yet understood. We will use the Li abundances derived from the GES to investigate this issue in intermediate-age and old open clusters, starting with Trumpler 20.

Interested in joining: Alessandro Lanzafame, A. Vallenari, Paola Sestito, Rodolfo Smiljanic, Rob Jeffries

3F.- Project: Abundance ratios in old and intermediate-age open clusters: a comparison with field stars

Proposers: Laura Magrini, Sofia Randich, Enrico Maiorca, Lorenzo Spina

Abstract: The thin disk of our Galaxy is believed to be formed by dissipation of star clusters, and thus, in principle, we expect that the abundance ratios of field stars and present-day open clusters should be similar. Several studies are however showing that the abundances of some elements behave in a different way in clusters and in the field (e.g., Friel et al. 2010; Carrera & Pancino 2011; Reddy et al. 2011), and, in addition, the

abundance ratios might be different in clusters with different age and/or located at different Galactocentric distances. A possible explanation might be that the youngest clusters are still intact, while the oldest ones may be totally disrupted, and consequently the field stars do not fully sample the age distribution of open clusters with the youngest stellar generations are under-represented by field star. The GES survey is giving us, for the first time, the unique opportunity to analyse a large sample of cluster and field stars in a completely homogeneous way. The first three old and intermediate age open clusters observed within the GES survey, namely Trumpler 20, NGC4815, and NGC6705, allow us to give a first look not only to the metallicity but also to their abundance ratios. In this project we will show the comparison with MW field stars considering elements of different origin, such alpha-, iron-peak, and neutron-capture elements.

Interested in joining: A. Bragaglia, P. Donati, E. Friel

G) Section STELLAR EVOLUTION

1G = 1F.- Project: Lithium abundances in young clusters

2G.- Project: Accretion and outflow processes in young clusters as a function of evolutionary stage and environment conditions

Proposers: R. Bonito (UNIPA-INAF-OAPa), L. Prisinzano (INAF-OAPa), G. Micela (INAF-OAPa)

Abstract: The Gaia-ESO Survey data will allow us to get a deep insight on the physical processes occurring during the first evolutionary stages of the star formation. In particular, from the analysis of the H alpha emission line profiles we can derive detailed information on the accretion and outflow activity at work in the young stellar objects (YSOs). These processes are intimately related to the presence of a circumstellar disk surrounding the YSOs. We can therefore study two main topics: 1) the accretion and outflow activity in different physical conditions of the circumstellar disk, namely its evolutionary stage and its mass; 2) the accretion and outflow activity in different young clusters to understand as these processes are influenced by the environment, by the presence of O-stars and by the cluster age. We will start with Gamma 2 Velorum and Cha I that are very different in terms of spatial distribution and age.

3G.- Project: CNO abundances in open clusters

Proposers: Grazina Tautvaisiene, Rodolfo Smiljanic, Sarunas Mikolaitis, and the Vilnius node

Abstract: A number of open clusters with CNO abundances determined in stars along the entire evolutionary sequence is negligible. The Gaia-ESO Survey will allow us to homogeneously determine CNO abundances in stars of a large number of open clusters with various turn-off masses and experimentally identify locations on the evolutionary sequences were a dredge-up and extra-mixing start acting. The determined CNO abundances will serve for the evaluation of theoretical models of stellar evolution and for the Galactic radial abundance gradient analysis.

Interested in joining: Paola Sestito, Concepcion Node (Geisler, Villanova, San Roman)

4G = 2F.- Project: The evolution of lithium depletion in open clusters

5G.- Project: Rotation and activity of low-mass stars in NGC6705=M11

Proposers: Alessandro Lanzafame (UniCt), Sergio Messina (INAF-OACt), Antonio Frasca (INAF-OACt), Elisa Brugaletta (UniCt) Katia Biazzo (INAF-OACt)

Abstract: The rich and dense open cluster NGC6705=M11, with an age of 200 Myr, samples an interesting phase in the stellar angular momentum evolution. Being slightly older than the Pleiades and significantly younger than the Hyades, it covers an age interval in which a large fraction of its low-mass members experiences a significant transport of angular momentum from the radiative core to the convective envelope. The rich and dense environment could also influence the timescales of circumstellar disc dissipation, whose effects could still be detectable at the age of NGC6705=M11. The acquired FLAMES spectra will provide, together with basic stellar parameter (Teff, logg and metallicity), extensive information on the chromospheric activity, through the analysis of the Halpha and on the projected rotational velocity (vsini). They will also allow us to identify likely binaries. Such information alone will allow us to verify current models for the angular momentum evolution, outlining also systematic differences that may arise from the dense and rich stellar environment. When such information is combined with the photometric analysis on the rotational modulation carried out by Messina et al. (A&A 513, A29, 2010), it will allow us to derive the inclination of the stellar rotation axis and on the correlation between photospheric and chromospheric magnetic activity. The results obtained will considerably improve current empirical activity-rotation-age relationships.

6G.- Project: Astrophysical Parameters of Intermediate Mass Pre-MS A-type Stars in Young Open Cluster NGC 3293

Proposers: Alex Lobel (ROB), Ronny Blomme (ROB), Yves Fremat (ROB)

Abstract: The young open cluster NGC 3293 is an excellent laboratory for studying the star formation physics of intermediate-mass stars with 1.5 Msun < M* < 4 Msun. We perform an analysis of VLT-Giraffe spectra of A-type stars observed in the Gaia-ESO Survey and determine the astrophysical parameters Teff , surface gravity log g, mean atmospheric metallicity [M/H], projected microturbulence velocity $\zeta\mu$, and projected rotational velocity vsini with detailed spectrum synthesis calculations. A sample of over 130 selected PMS A-stars is first tested for cluster membership based on color-magnitude diagrams of NGC 3293. Preliminary results for this sample show that the variance of [M/H] decreases towards the earlier A-type stars, approaching solar metallicity values. These low-luminosity stars with L* < 320 Lsun are gravitationally contracting onto the ZAMS over K-H timescales below 20 Myr. We will investigate the relationship between the fundamental stellar parameters M* and R*, and their dependences of vsini and the stellar ages using PMS evolutionary tracks. The results will improve current models of angular momentum transport in the formation processes of intermediate-mass stars.

I) Section TECHNICAL AND METHODS

1I.- Project: Evolved stars in open clusters: a check on the quality of analysis methods

Proposers: Laura Magrini, Rodolfo Smiljanic, Eileen Friel, Angela Bragaglia, Antonella Vallenari

Abstract: Stars belonging to Open Clusters are a powerful tool to check the quality of the different method of analysis. They are indeed located at well known distances and selected in certain evolutionary status. Their reddening is well determined using their color magnitude diagrams. Thus, their stellar parameters are already well known in good approximation before the spectroscopic analysis and can be easily compared with theoretical isochrones. We propose to use the study done by different Nodes and with different methods (EWs, synthesis, etc.) of the evolved Red Clump stars observed in the first old/intermediate-age Open Clusters, namely Trumpler 20, NGC4815, and NGC6705, to check the quality of the different methods in the range of parameters of evolved giant stars. We aim also at comparing the different results with evolutionary tracks.

Interested in joining: Ulrike Heiter, Paolo Donati, Tristan Cantat, R.Sordo