# Participant & project presentations

Frontiers of stellar evolution MWGaiaDN School





# Antonella Vallenari

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# What I do

- Open clusters in the Milky Way
- PI of WEAVE/4MOST cluster survey
- Gaia astrophysical parameters & Validation
- Interested in applications of Gaia data

#### Main goals for this week

- Get to know you
- Learn about your research projects
- Contribute to team building

#### I can help with

- Gaia stellar parameters
- Stellar populations in the Galaxy

# Angela Bragaglia angela.bragaglia@inaf.it INAF-OAS Bologna

# What I do

- Open clusters in the Milky Way
- Globular clusters in the Milky Way
- co-PI of 4MOST Stellar Cluster survey (S13)
- SWG and co-lead of Galactic Archaeology-Open Clusters survey in WEAVE
- High resolution spectroscopy of stellar clusters (not only surveys)

# Main goals for this week

- Try to present (part of) the huge spectroscopic data set existing and planned
- Learn about your research projects





## I can help with

- Stellar spectroscopy
- Stellar populations in the Galaxy

[Sorry, I will be in Padua only on the 15 and 16. I will try to follow on-line the 17]





Università degli Studi di Padova



Dipartimento di Fisica e Astronomia Galileo Galilei

# **Michele Trabucchi**

michele.trabucchi@unipd.it University of Padova Department of Physics & Astronomy





# What I do

- Late evolution of low-/intermediate-mass stars
- Variability, mass-loss, stellar winds
- Hydrodynamic simulations of pulsating stars
- Variable stars in stellar populations
- Variable stars as distance and age indicators
- Member of *Gaia* & LSST

ASTRONOMICO DI PADOVA

• Teaching: stellar structure and evolution



Università degli Studi di Padova



Dipartimento di Fisica e Astronomia Galileo Galilei



# Giada Pastorelli

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University of Padova Department of Physics & Astronomy



# What I do

- Evolution of low- and intermediate-mass stars
- Simulated photometry and physical parameters of resolved stellar populations
- Star formation history of resolved systems
- Rubin-LSST Stars, Milky Way & Local Volume Science collaboration

# Main goals for this week

- Get to know you and your research projects
- Sharing my fascination (and <del>occasional</del> frustration) for AGB stars with you



# I can help with

- Stellar populations in nearby galaxies
- Web interfaces & tools from the Padova stellar astrophysics group

# Salvatore Ferrone





# What I do

• Simulate mass loss of Galactic globular clusters

# Goals for this week

- Learn how to query Gaia data
- Make plots with Gaia data
- Learn how to use stellar isochrones

# **Project ideas**

 Make mock observations of my clusters' tidal tails



# Georges Meynet Georges.meynet@unige.ch





FACULTÉ DES SCIENCES Département d'astronomie

#### Stars at the Extreme





#### <u>What I do</u>

- Stellar physics
- Computation of evolutionary tracks
- Nucleosynthesis
- PI of STAREX advanced ERC project (2020- 2024)

#### Main goal for this week

- Transfer of some knowledge
- Learn new topics
- Meet new colleagues
- Hopefully stimulate new ideas

#### I can help with

- Stellar physics
- Stellar evolution computations
- Isochrones
- Transport processes in stars



# Anita Zanella

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# What I do

- Galaxy formation and evolution
- Star-clusters at cosmological distances (in high-redshift lensed galaxies)
- Sonification as a means for astronomical data representation
- Multi-sensory, hands-on public engagement activities

# Main goals for this week (only Wednesday)

- Have fun with you discussing about multi-sensory astronomy
- Learn (at least a bit!) about stellar evolution and Gaia

## I can help with

- High-redshift observations
- How to disseminate your results to the general public
- How to use sound to explore your datasets









# What I do

- Open clusters in the Milky Way
- Asteroseismology of evolved stars with Kepler and TESS
- member of Gaia: astrophysical parameters & Validation
- member of *Ariel* Stellar Characterization working group : ages and masses of the input catalogue
- member of *Plato*: Red giant catalogue for stellar calibration

# I can help with

• Stellar Evolution

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- Asteroseismology
- Characterising stars







# **Guglielmo Costa**

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University of Lyon 1,

soon at

University of Padova Department of Physics & Astronomy





Università degli Studi di Padova



Dipartimento di Fisica e Astronomia Galileo Galilei

# What I do

- Stellar structure and evolution
- Physical processes in stars
- Final fate of massive stars
- Black holes mass spectrum
- Binary evolution
- Outreach events (e.g. <u>Astronomy on Tap</u>!)

[Sorry, I won't be in Padova because I'm going to be a dad soon! Enjoy the school!]

#### Marc del Alcázar i Julià

IEEC-ICCUB, mdelalju@fqa.ub.edu







# What I do

- Derivation of Galactic parameters with BGM FASt
- Member of the WEAVE consortium:
  - In charge of GA LR disc OBs preparation
  - Responsible for SCIP HR AC at UB
- Studentship Programme at the ING

# Main goals for this week

- Get both detailed and holistic views on stellar evolutionary models
- Learn on the complexity of age determination
- Understand how asteroseismology works

# My project ideas

 Present the results of my PhD: derivation of the Galactic SFH and IMF using different stellar evolutionary models



# Alessio Liberatori

University of Athens, aliberatori@phys.uoa.gr

#### What I do

- Explore AGB Carbon stars properties
- Stellar evolution of AGB stars
- Searching new carbon stars proxies

#### Main goals for this week

- Deepen knowledge in stellar evolution models and AGB stars stellar populations
- Learn Trilegal
- Learn principles of Asteroseismology
- Learn M-L tools and apply them
- Collaborate and connect

## My project ideas

Derive stellar ages for a population of AGB carbon-rich stars



National and Kapodistrian University of Athens







# Ioannis N. Kallimanis

INAF-OAPd, University of Padova *ioannis.kallimanis@inaf.it* 

# What I do

- Open clusters
- Precise age determination
- Membership analysis

# Main goals for this week

 Understand how stellar evolution models work

MWGaiaDN

Doctoral Network

• Understand the systematics introduced by stellar models to the stellar parameter inference

# I can help with

- Bayesian fitting tools
- Coding

# My project ideas

• Comparing parameters estimated by fitting different stellar models





# Pietro Facchini



ZENTRUM FÜR ASTRONO

# What I do:

- OB associations and young star clusters in nearby star forming galaxies
- Runaway stars
- Massive stars in the field of nearby galaxies

# My goals for the week:

- Learn about the age determination
- To increase my knowledge of models of stellar evolution



# **Project idea:**

Comparison of the CMD of the tails of open clusters and that of the core

# Natsuki Funakoshi

University College London, UK <u>n.funakoshi@ucl.ac.uk</u>

# What I do

- kinematical diversity of spiral arms in the Milky Way using Cepheids (published in <u>MNRAS(link)</u> !)
- Current project: trace the Galactic disk figure depending on stellar age using APOGEE Red Giant stars by MCMC fitting

# Main goals for this week

- learn on stellar age determination, especially how asteroseismology works on it
- understand the stellar evolution model and stellar parameters

Kinematical diversity of spiral arms Rotation Cepheids around Perseus arm: Diverging from the arm



outer



Cepheids around Outer arm:

Converging into the arm



# **Thomas Hajnik**

University of Cambridge, th721@ast.cam.ac.uk

# What I do

- Developing of a low-density (bright star) observing mode for WEAVE
- Designing a survey on exoplanet host stars
- Host-star / planet relations

# Main goals for this week

Deepen understanding of Stellar Evolution

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30000

20000

10000

6000

- Learn how to derive stellar ages
- Collaborate and connect

# My project ideas

Explore supervised MI methods for stellar age determination



# Natalia Alvarez Baena

Erasmus Mundus Joint Master program in Astrophysics and Space Science (MASS)

Universitá degli Studi di Roma "Tor Vergata" natalia.alvarezbaena@students.uniroma2.eu

# What I do

- Dynamical evolution of Open Clusters.
- In progress: Chemical abundances of OCs.
- Future interest: using the above to study the dynamical and chemical evolution of the galactic disc.

# Main goals for this week

- Further understanding in stellar evolution and asteroseismology.
- Get familiar with the different ongoing spectroscopic ground-based surveys.
- Improve abilities with machine-learning, especially regarding its astrophysical applications.
- Meeting new people and establishing collaborative connections for my next academic steps (PhD).

# My project ideas

• 3D reconstruction of Open Clusters' structure.



# Mahdieh Navabi

# Phd Candidate at University of Surrey (UK)

#### What I do:

- Working on the metallicity of Small Magellanic Cloud (SMC) with the largest sample of RGB field stars
- Obtaining the radial and azimuthal metallicity gradient of SMC
- Obtaining the chemical enrichment of the SMC using alpha element abundances

#### Main goals for this week:

- Learning how to derive stellar parameters using stellar models
- Utilising Gaia data to enhance our photometric and spectroscopic analysis.

## My Project idea:

• How to derive ages of RGB stars on the SMC



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#### **Chloé Padois**

PhD student at ICCUB, Universitat de Barcelona chloe.padois@fqa.ub.edu

#### What I do

- Simulation of exoplanet population in a MW simulation
- Compare synthetic exoplanet populations to observations

#### Main goals for this week

- Learn more about stellar evolution models
- How are made isochrones/stellar tracks libraries
- Learn about age determination
- Learn about TRILEGAL
- Understand better asteroseismology

# My project ideas

- Explore supervised ML methods for stellar age determination (ft. Thomas)
- OR compare different stellar evolution models results for our synthetic stellar population in a simulated Galaxy.





 $\log(T_{eff})$ 

# **Mauritz Wicker**

mwicker@astrouw.edu.pl \*\*\* Warsaw University Astronomical Observatory

# What I do

- Time domain astronomy with Gaia Science Alerts
- Gravitational microlensing (photometric + astrometric)
- Black hole detection through quasar lensing in the Milky Way Halo

## Main goals for this week

- Learn about stellar evolution and isochrones
- Learn about spectroscopic surveys
- Learn about stellar population studies (specifically in the MW halo)
- Collaborate and connect

# My project ideas

- Study stellar Isochrones for Gaia ≤ sources using PARSEC (Bressan et al. 2012)
- Use of spectroscopic surveys





\* UNIVERSITY OF WARSAW

BHTOM

# Manuela Leguizamón Pineda

Master in Astrophysics and Cosmology, University of Padova paulamanuela.leguizamonpineda@studenti.unipd.it

# What I do

- Open clusters
- Multiple Stellar Populations
- Interacting binaries and stellar rotation

# Main goals for this week

- Understand how machine learning could be implemented in MSPs
- Get familiar with the different stellar surveys and how to make the best out of them
- Better understanding in stellar evolution

# My project ideas

- Comparing parameters estimated by fitting different stellar models (collaboration with Ioannis)
- Retrieve data related to binaries and stellar rotation to compare them with MSPs scenarios



#### Laura Ramírez-Galeano

PhD student at Observatory of Geneva laura.ramirezgaleano@unige.ch

# What I do

- Supermassive star (<10^3 10^4 Msun) models with MESA, to explain multiple stellar populations (MSP) and abundance anomalies in GCs.
- Studying runaway collisions and their impact on SMS.

# Main goals for this week

- Investigate Gaia DR3
- Better understanding of asteroseismology
- Collaborate and connect

# My project ideas

- Study the membership of stars in GCs using Gaia astrometric data and photometric data.
- If it is possible, compare the observed composition with predictions from SMS models.



# Erika Korb

erika.korb@studenti.unipd.it

# What I do

- Stellar and binary evolution with MESA (massive stars)
- Mass transfer physics modeling
- Population synthesis studies (e.g. SEVN code with PARSEC tracks)
- Progenitors of gravitational wave merger binaries

## Main goals for this week

- Learn current and expected discoveries from Gaia
- Understand where (and where not, yet) we can use asteroseismology to constrain stellar interiors
- Learn from tutorials on ML and asteroseismology how to derive stellar parameters from observations

## My project ideas

- Study the impact of different stellar models (also with different codes e.g. MESA, PARSEC) on the mass transfer physics
- Observational constraints for stellar and binary evolution from the observation of Gaia BHs and Gaia NSs







lorio et al. 2024

# **Andrew Garner**

PhD student University of Surrey Andrew.Garner@surrey.ac.uk



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# What I do:

- Combine binary population synthesis code with a distribution based Milky Way model to infer stellar population properties
- Use these models to also study sub-populations related to binary physics

# Goals:

- Better understand about stellar evolution models
- Understand asteroseismology for stellar age determination

# **Project:**

• Searching for possible binary products locally (chemically peculiar, RUWE)



