Galactic Astronomy

2019-2020

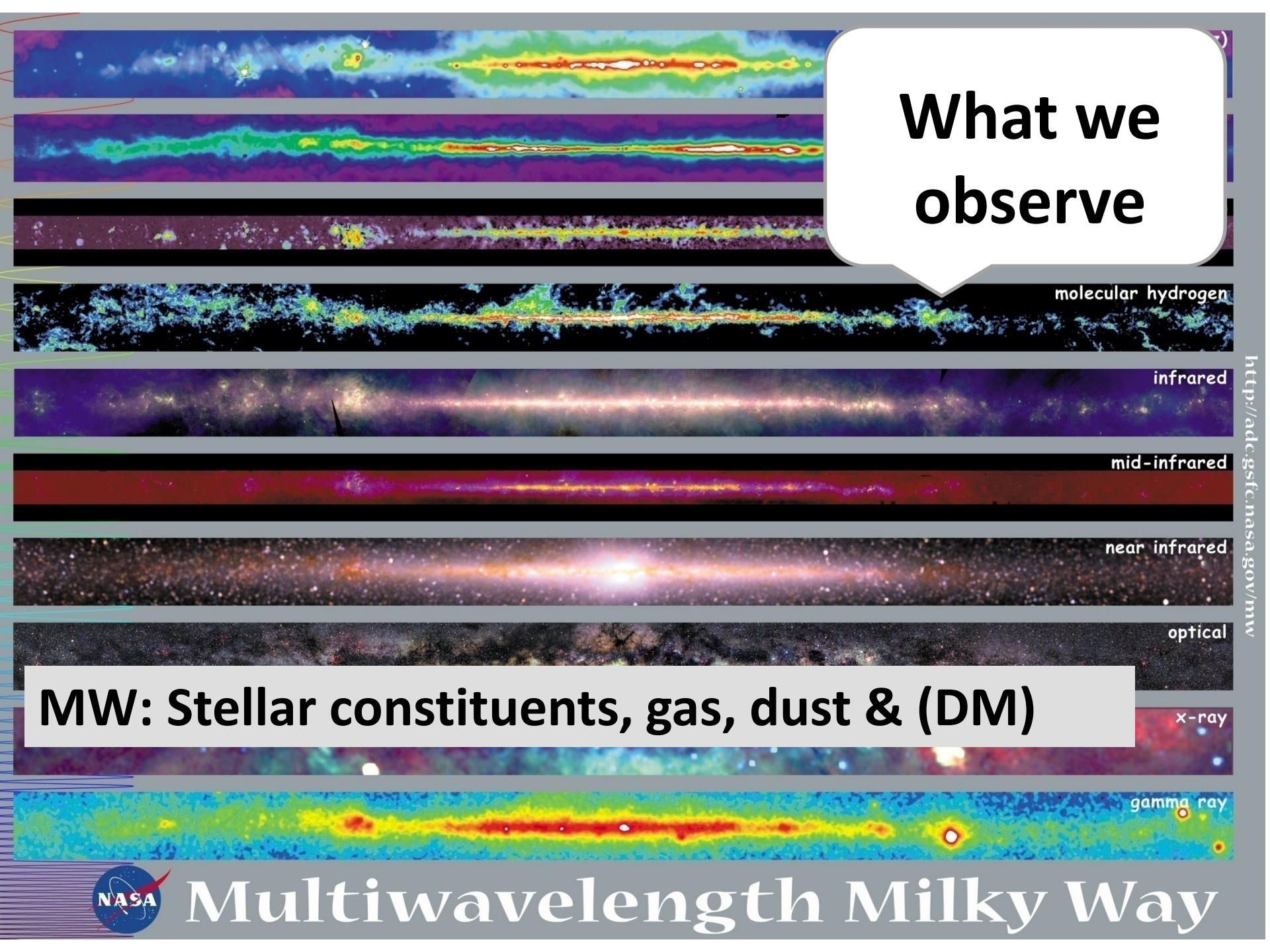
Professors:

Francesca Figueras, Carme Jordi, Mercè Romero-Gómez,
Teresa Antoja (Gaia Team Researchers)

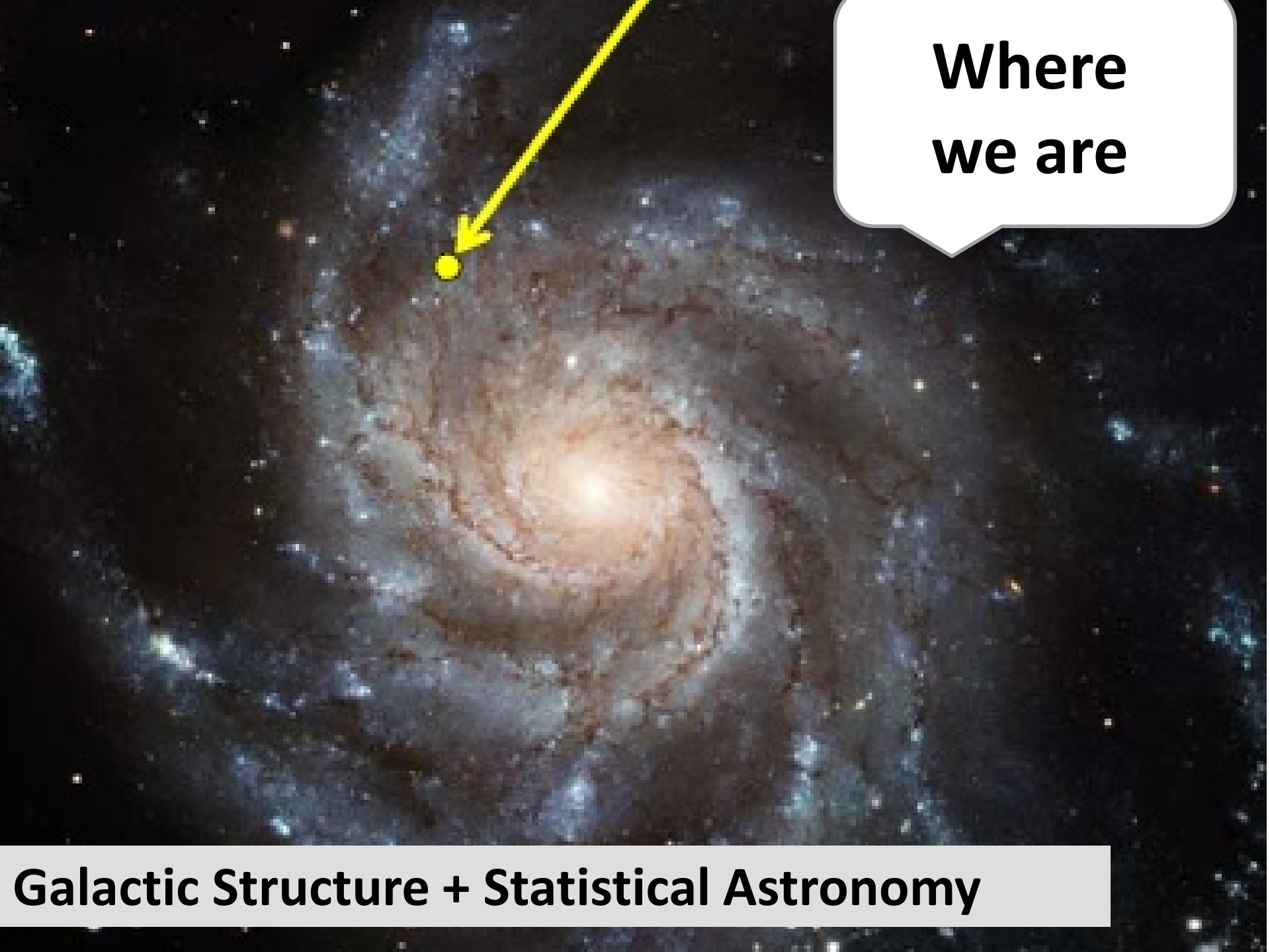
Course: **Galactic Astronomy**
Master: Astrophysics, Physical Particles and Cosmology
Course: 2019-2020

Programme:

1. Introduction
2. Astronomical measurements
3. Statistical astronomy
4. Galactic Structure
5. Galactic Kinematics
6. Fundamental equations of stellar dynamics
7. Stellar orbits in the Milky Way potential
8. Collisions and encounters of stellar systems
9. An introduction to the chemical evolution of the Milky Way
10. Formation and evolution of galaxies



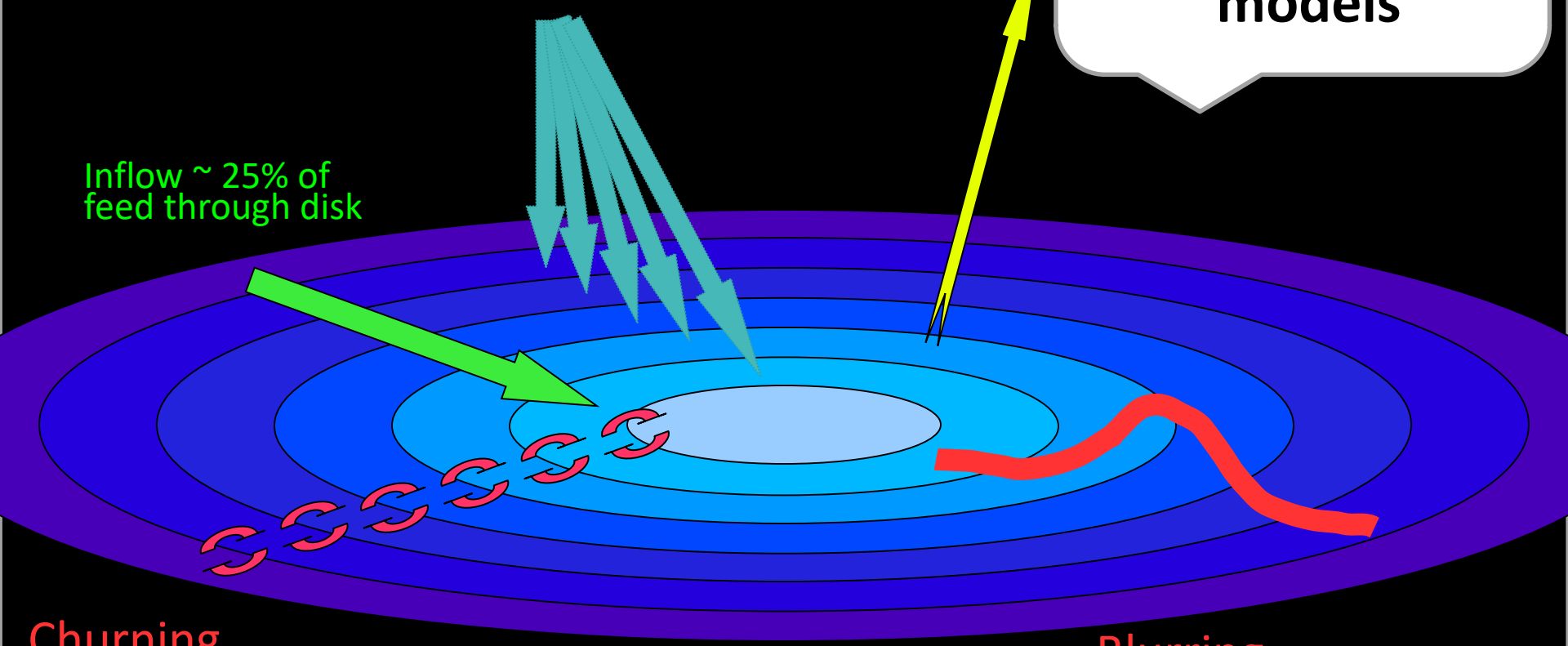
MW: Stellar constituents, gas, dust & (DM)



Galactic Structure + Statistical Astronomy

Schoenrich & Binney M

Chemo-dynamical models



Churning
-mass exchange between neighbouring rings
-cold gas and stars
-no heating of the disc

radial spacing 0.25 kpc

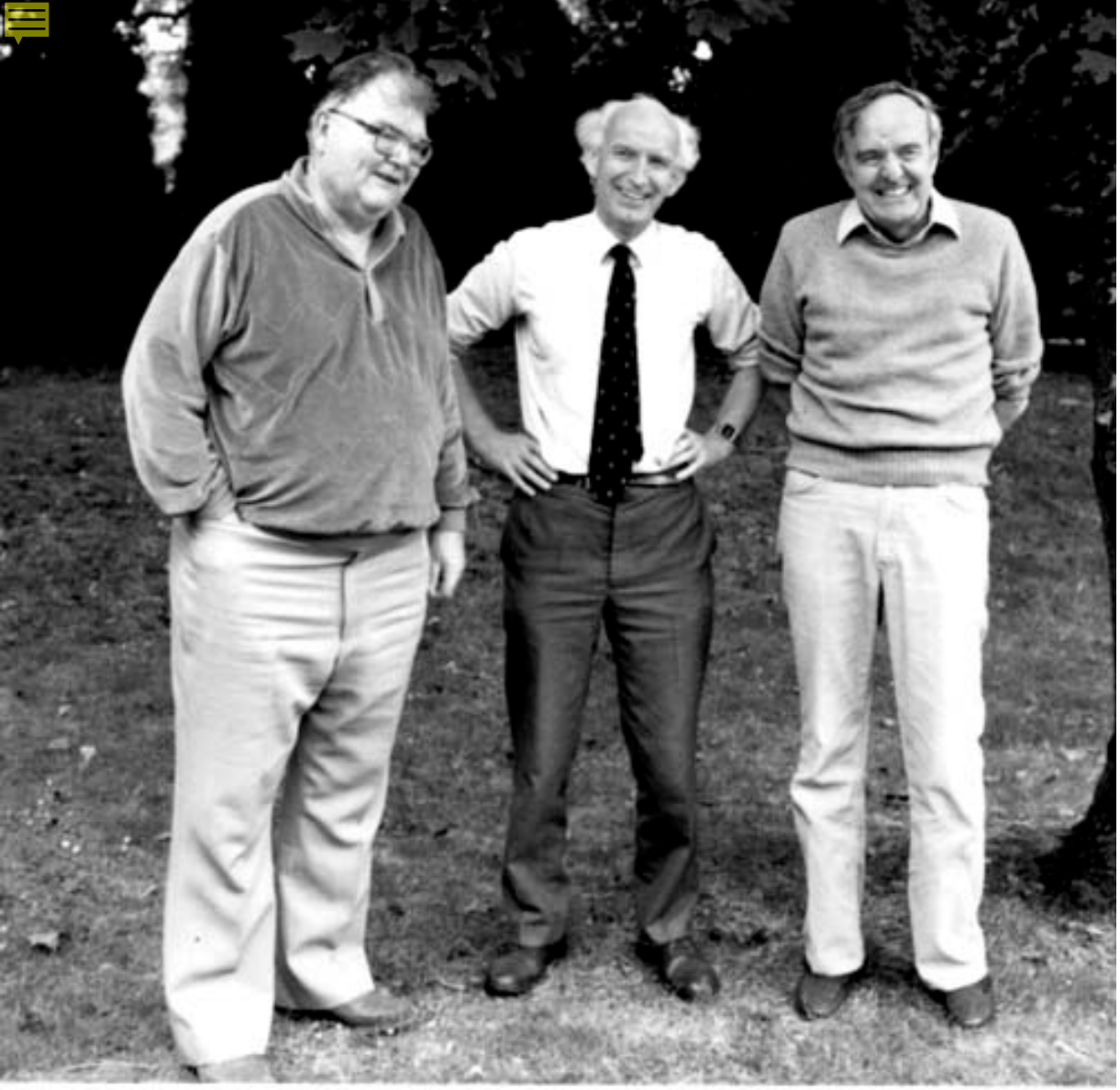
Blurring
-stars on increasingly eccentric orbits
(heating of the disc)

disc and
ht

Structure → Kinematics → Dynamics → MW Mass Model

Towards a chemo-dynamical evolution of the MW

How did our galaxy and its components form?
XXI Century: the MW as a cosmological laboratory

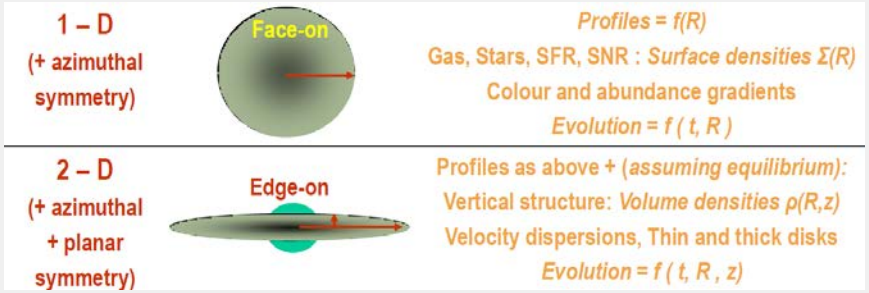


Gaia + WEAVE + large scale surveys … a dream in 1962!

Galaxy formation and evolution are encoded in the location, kinematics (6D) and chemistry of stars

External Galaxies

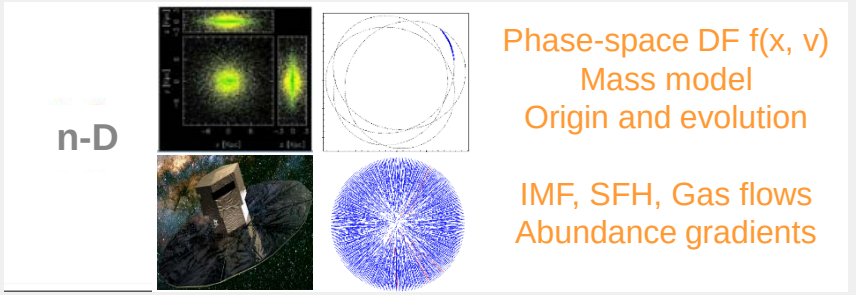
Galaxy outskirts, low-density regime: hard to observe and therefore often ignored



Galaxy evolution:
from local Group to high-redshift systems

Milky Way

The MW: our cosmological laboratory, resolved stellar populations



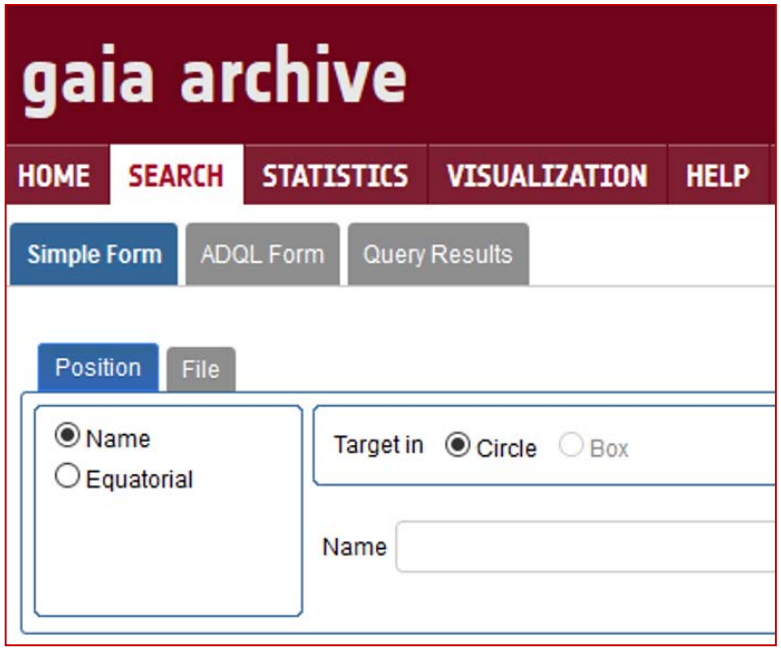
The MW and its satellites

Common goals: galaxy formation and evolution

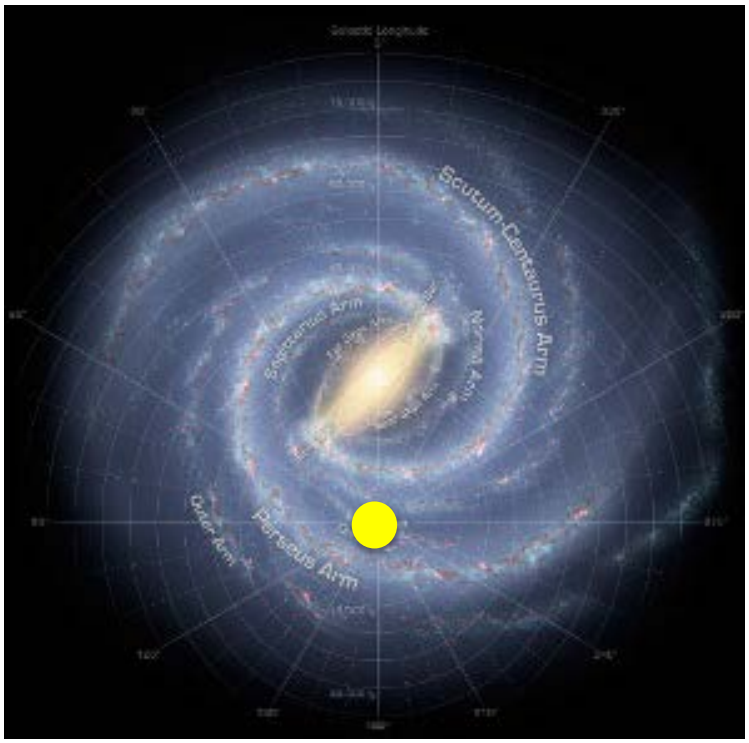
A chemo-dynamical model, processes of gaseous and satellite accretion, radial migration, merging, disc formation (in-out) …..

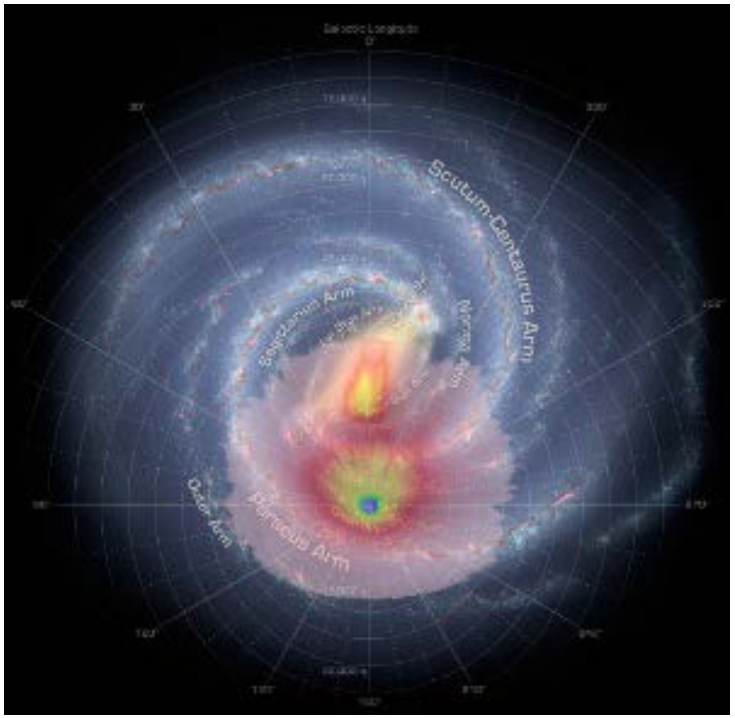
2 years of successful scientific operation

December 19th, 2014
10:12 CET



1st Release: Sep 14th, 2016
2nd Release: April, 2018


Scutum-Centaurus Arm
Sagittarius Arm
Norma Arm
Outer Arm
Perseus Arm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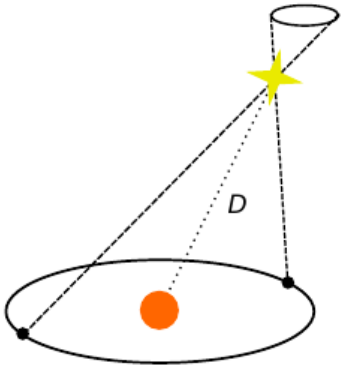
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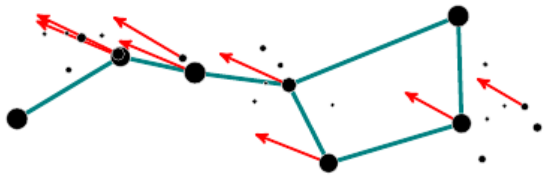
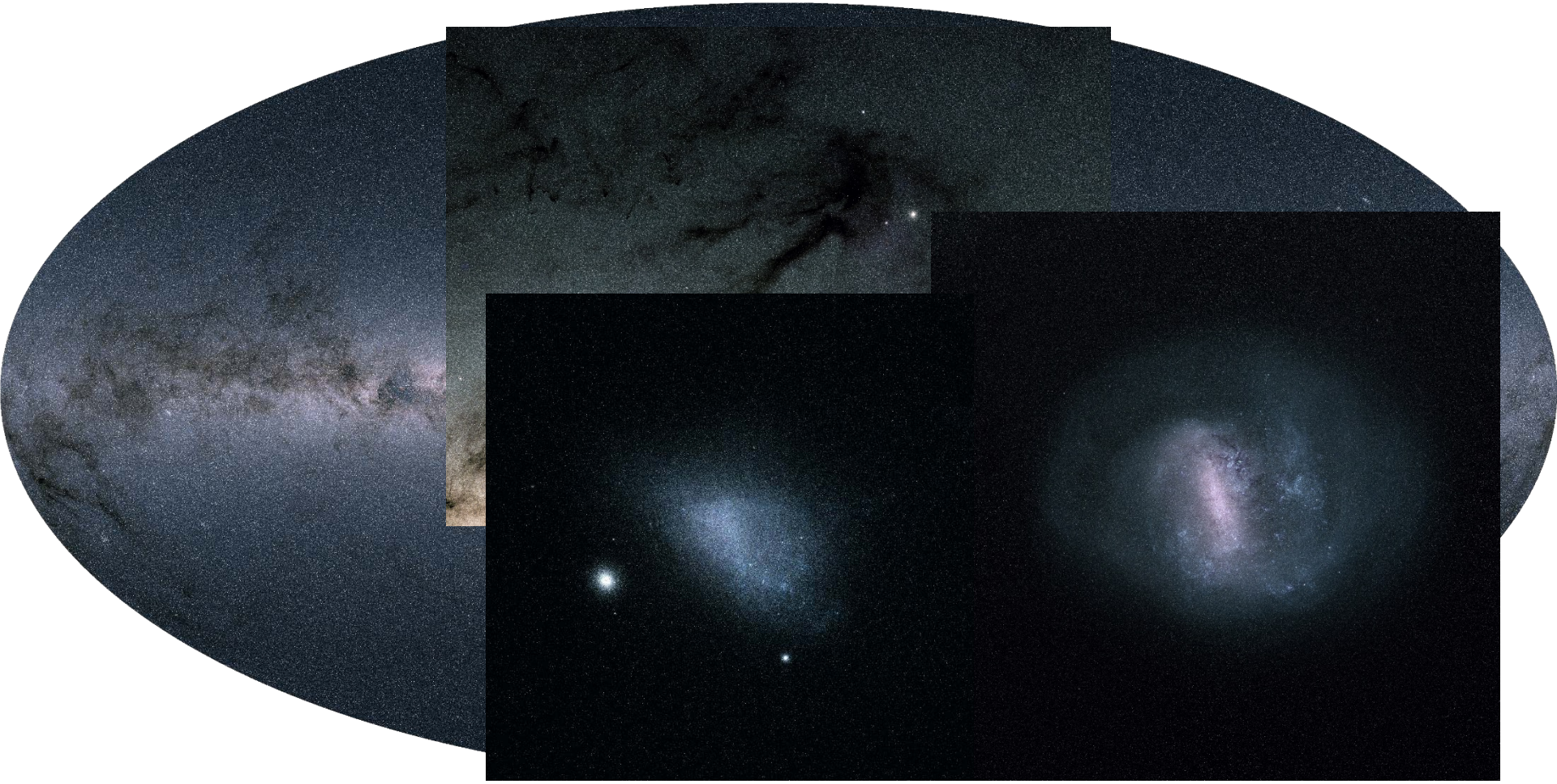
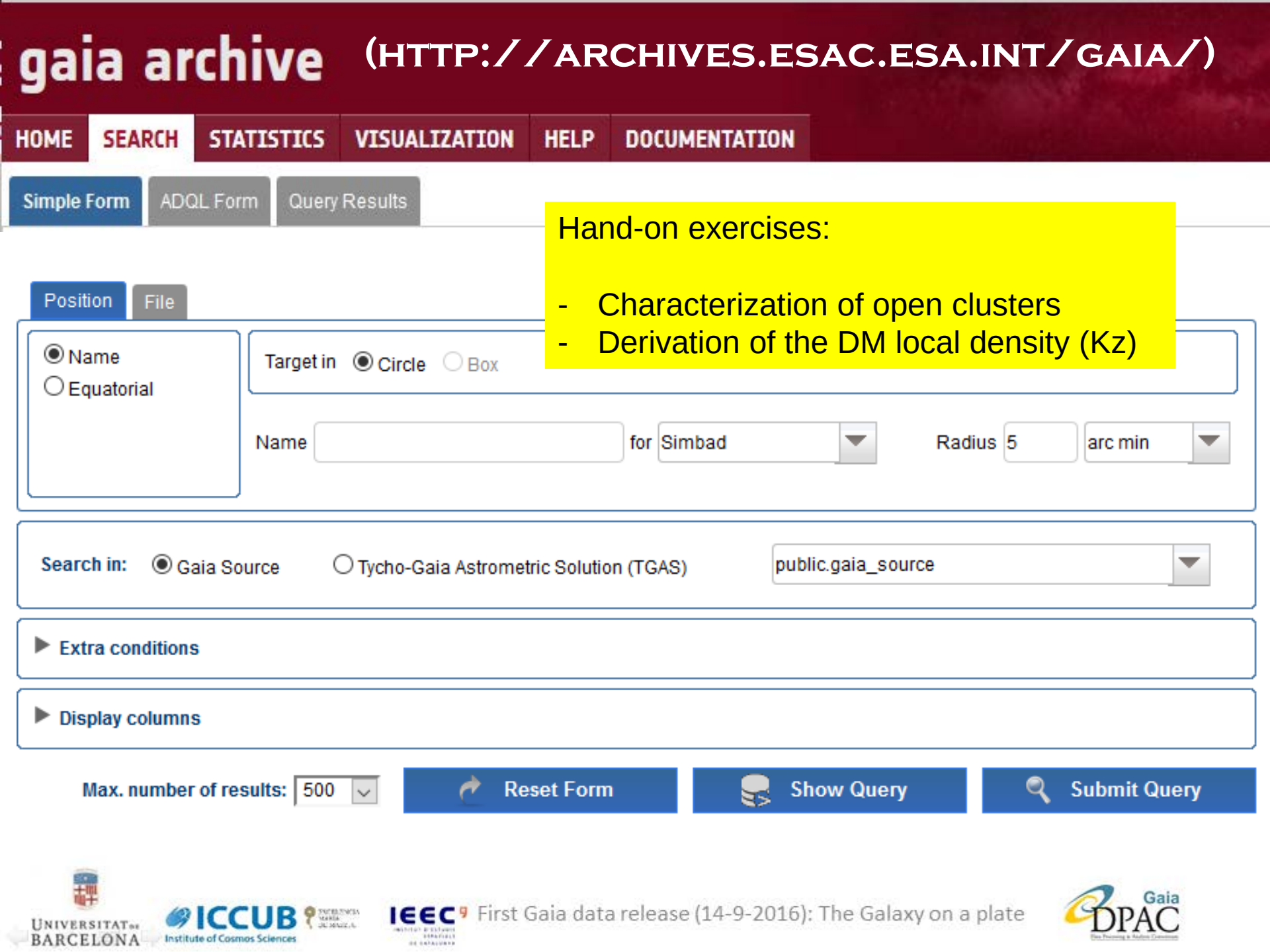


Gaia Catalogue, DR2 25-April-2018



Goals of GA course:
from the observables to the population synthesis and chemodynamical models


gaia archive
(HTTP://ARCHIVES.ESAC.ESA.INT/GAIA/)
HOME
SEARCH
STATISTICS
VISUALIZATION
HELP
DOCUMENTATION
Simple Form
ADQL Form
Query Results
Hand-on exercises:
- Characterization of open clusters
- Derivation of the DM local density (Kz)
Position
File
Name
Equatorial
Target in
Circle
Box
Name
for
Simbad
Radius
5
arc min
Search in:
Gaia Source
Tycho-Gaia Astrometric Solution (TGAS)
public.gaia_source
Extra conditions
Display columns
Max. number of results:
500
Reset Form
Show Query
Submit Query

Lectures from visiting professors
Course: **Galactic dynamics**

Invited professor :

Dr. Mark Gieles
(ICCUB-ICREA)

In this course, the basic principles on Galactic Dynamics learned during the school will be applied to some key stellar systems in the Galactic halo. Examples of them are:

- Dynamics of Globular Clusters
- tidal streams
- Potential theory

December, 2019

Campus Virtual de la UB

cursos ► Curs acadèmic 13/14 ► Màsters ► Astrofísica, Física de Partícules i Cosmologia ► 1314AGC

Course info: Evaluation, dates, ...

Marks:

- 60 % Exam (short questions)
- 40 % Exercises (short exercises and oral presentations)

Dates for the evaluation:

- Exam: 2nd week of January
- Exercises: to be presented before the end of January
- Oral presentation of exercises: during the course

Milky Way size galaxy formation and high performance computing

COST WG1 Milky Way Gaia School

14-17 January 2020
Institute of Cosmos Sciences (ICCUB-IEEC)
Europe/Madrid timezone

Contacte

secretariacientifica@icc....

Outline of the school

This is the first school of the WG1 *The Milky Way as a Galaxy* of the EU COST action MW-GAIA. The objective of this working group is the exploitation of Gaia data in combination with other survey data to address some of the most important questions in the formation and evolution of our Galaxy.

Being N-body and hydrodynamic simulations key tools to undertake the structure, star formation history, and dynamical evolution of the Milky Way, the goal of the school is to provide a general view of the current state of the art and challenges in simulating the formation of Milky Way size galaxies.

Currently, High Performance computing and Data Science tools are key to perform and analyze these simulations and to do a fair comparison with observations. With this in mind, it is a key goal of the school to provide to skills the students need to deal with such simulation/real data.

Starts 14 Jan 2020, 08:30
Ends 17 Jan 2020, 18:00
Europe/Madrid

Institute of Cosmos Sciences (ICCUB-IEEC)
University of Barcelona

Martí i Franqués, 1
08028 Barcelona

Poster_GaiaSchool2020.png