

Working Group 4

Gaia Fundamentals: Space and Time

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solar system objects \longleftrightarrow extragalactic objects (besides stars)

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❖ Gaia spins about its axis every 6h, covers the whole sky in few months

➔ superb telescope to investigate phenomena related with **variability** in scales of seconds, hours or weeks

❖ Gaia DR4 will provide time series for all sources (astrometry+photometry)

❖ Gaia DR5 will be based on 10 years of data !



Gaia Fundamentals: Space and Time

MW-Gaia COST Action; Working Group 4

different aspects related with **non-stellar objects**,
variable phenomena and **fundamental physics**

The transient sky

subgroup

Sonia Antón
Univ Coimbra

Calibrating the distance scale

subgroup

Tatiana Muraveva
INAF-OAS

Gaia Fundamentals: Space and Time MW-Gaia Working Group 4



different aspects related with **non-stellar objects, variable** (intrinsic or extrinsic) **phenomena** (including stars) and fundamental physics

Gravitational Waves

subgroup

Peter Jonker
SRON

Reference Frames and Fundamental physics

subgroup

Mariateresa Crosta
INAF-OATo

Calibrating the distance scale

direct (e.g. **parallaxes**) and indirect measures (based on intrinsic properties of the objects; **standard candles**)

The transient sky

flux **variability**; extrinsic: Gravitational lensing, Gravitational waves
intrinsic: novae and SNe, Tidal Disruption Events, Active galactic nuclei, etc

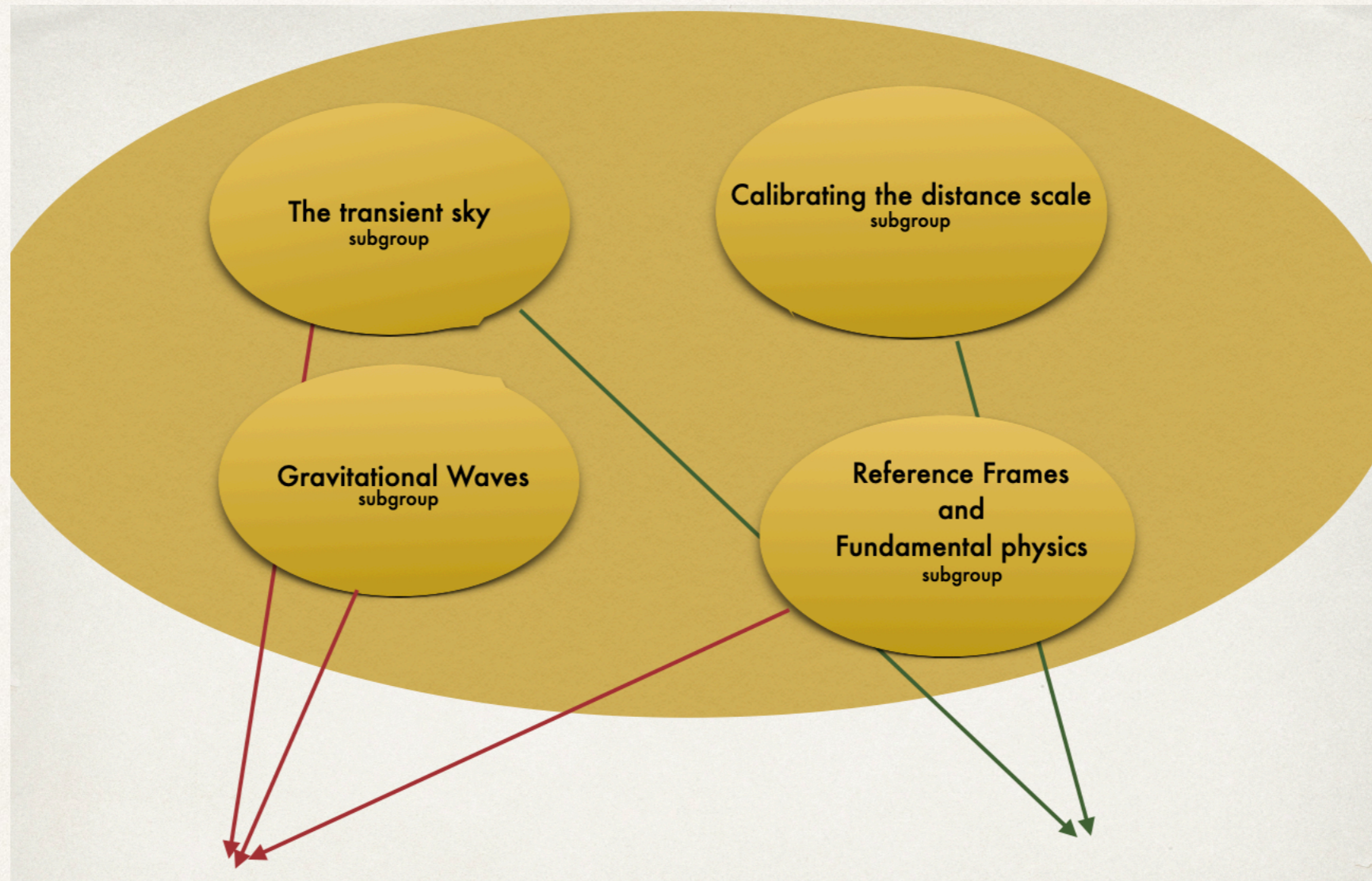
Gravitational Waves

the origin of the GW is crucial to investigate the phenomena → need to identify the **electromagnetic counterparts**

Reference Frames
and
Fundamental physics

alignment btw the International Celestial Reference Frame and Gaia Celestial Reference Frame; @ the micro-arcsecond level of accuracy **gravitational perturbations** might be relevant in the inverse ray-tracing

many subjects benefit from different tasks, eg:

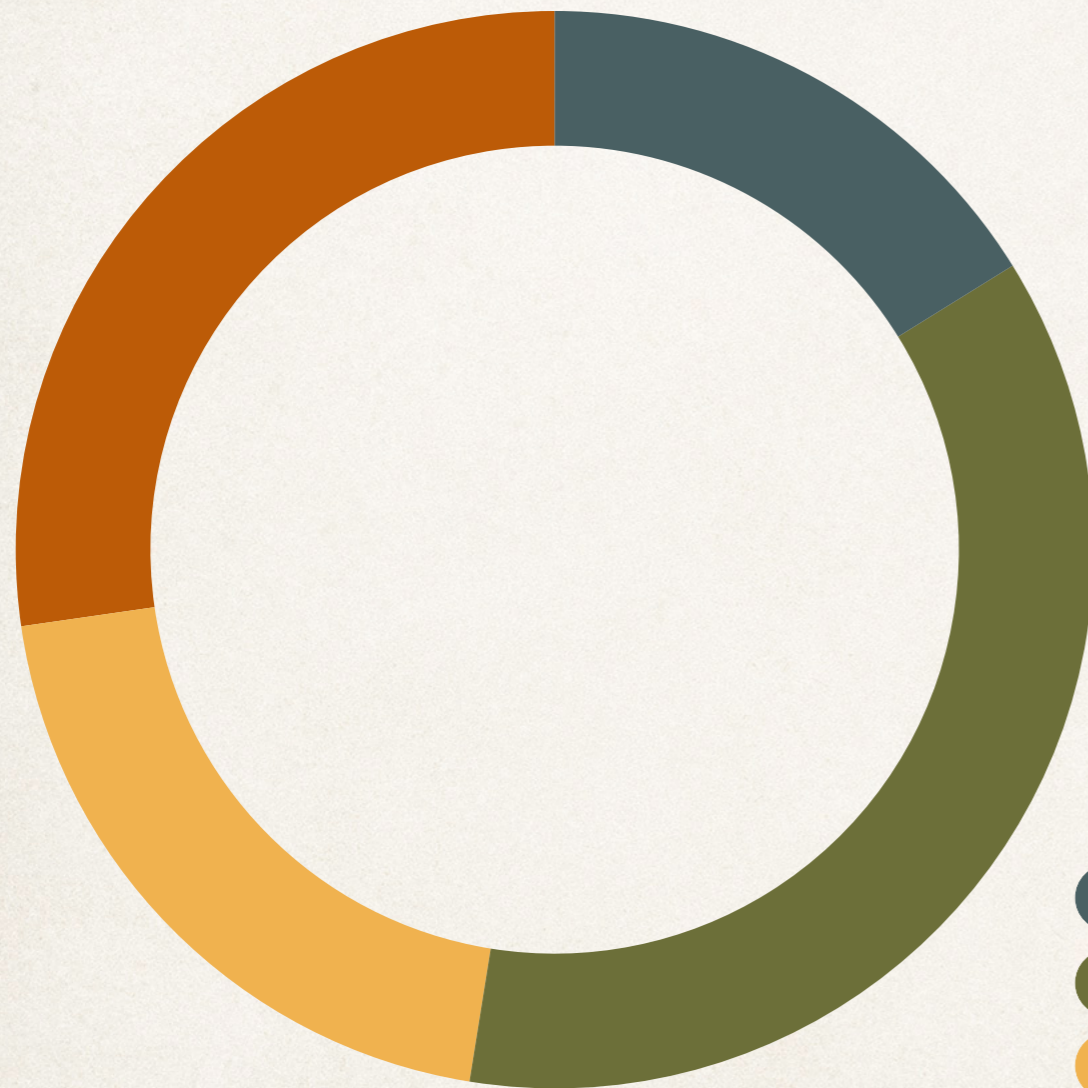


Active galactic nuclei

Regular variable stars

membership

Networking & Collaborations in the framework of COST Action



40 members distributed per
different thematic areas of the
working group

- Gravitational waves
- Transient phenomena
- Reference Frames, Fundamental Physics
- Calibrating the distance scale



workshops

Networking & Collaborations in the framework of COST Action

A Dynamical View of Sky

Observatory of Côte D'Azur 2019
Nice (France)

WG4

Astro-dynamics in different domains

Binary stars

Black holes

Galactic dynamics

Solar system

Galactic Centre and Inner Galaxy

Online Workshop 2021
Heidelberg (Germany)

WG1+WG4

The inner galaxy; EDR3

Structure and dynamics of the Galactic bar and bulge
region, and Inner Halo

Nuclear Disk, Gas Inflow and Star Formation

Gaia Ref Frame: zero points in parallax and proper
motion, fundamental physics and relativistic effects
using Gaia and VLBI, Sgr A* and testing GR



workshops

Networking & Collaborations in the framework of COST Action

Gaia beyond the Milky Way

Hybrid Workshop 2022
Athens (Greece)

WG1+WG4

Impact of Gaia DR on extragalactic science

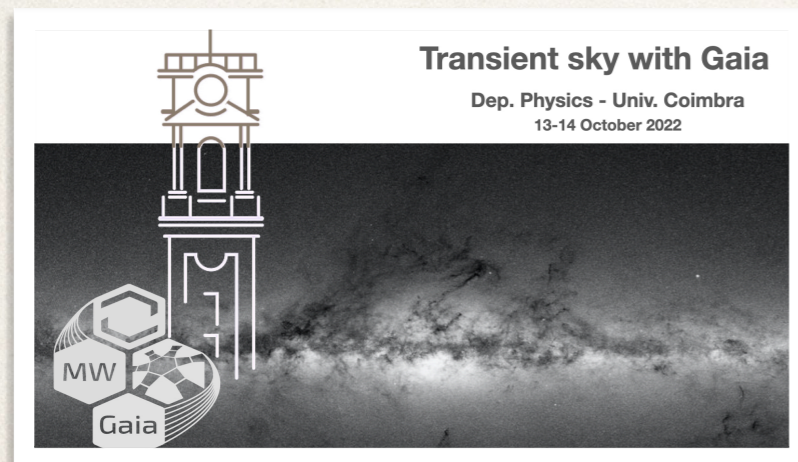
Improvement of the distance scale

Local group galaxies

Quasars and unresolved galaxies

Transient Sky with Gaia

Hybrid Workshop 2022
Coimbra (Portugal)



WG4+WG2

Latest results related to variable phenomena

Regular variable stars

SN and local Cosmology

Tidal disruption events

GW events

AGN variability and impacts to RF

Synergies: EUCLID, PLATO, Rubin and SKAO