



A 4MOST survey of young stars in the solar neighbourhood: the role of the laboratory

G.G. Sacco

NGC 2477

Zeta Pup

RCW 27

NGC 2626

RCW 32

NGC 2671

RCW 33

RCW 36

NGC 2643

G.G. Sacco

NGC 2660

gamma Vel

RCW 38

IC 2395

RCW 41

RCW 40

NGC 2670

NGC 2547

# 4MOST in a nutshell

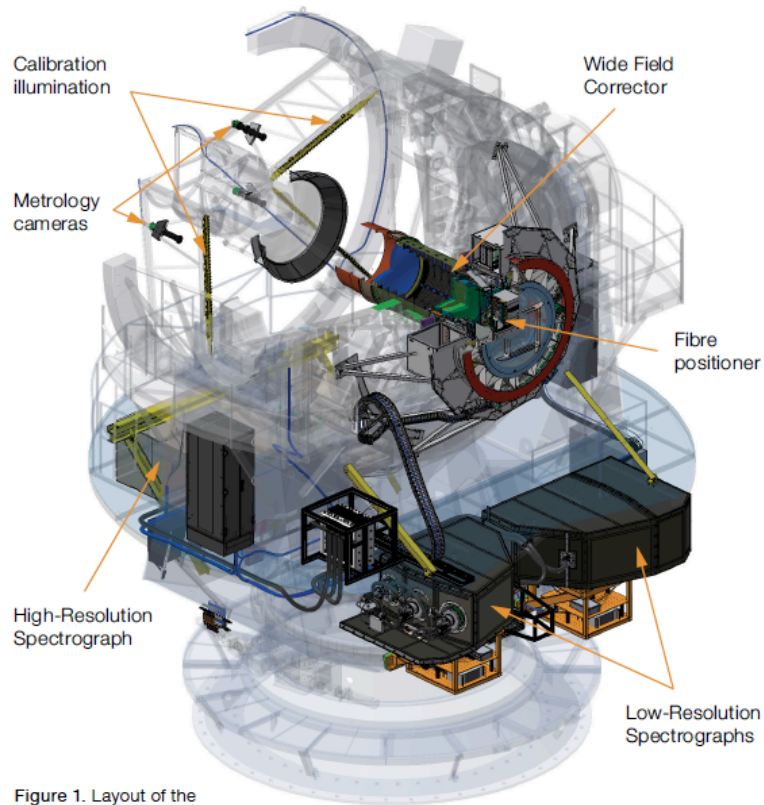
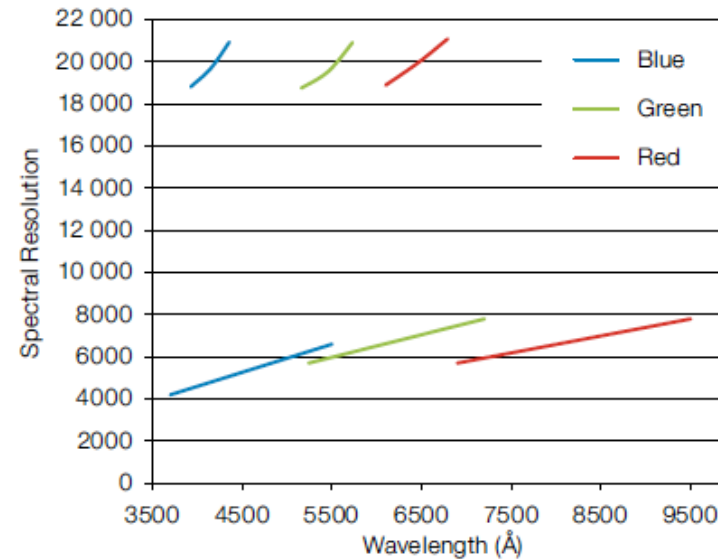


Figure 1. Layout of the different subsystems of 4MOST on the VISTA telescope.



Telescope: VISTA (4m at Paranal)

FoV: 4.2 deg<sup>2</sup>

Low res:  $R \sim 6500$ , fibers = 1624

Low res band: 3700-9500 Ang

High resolution:  $R \sim 20000$ , fibers = 812

High res band: 3926-4355, 5160-5730, 6100-6790 Ang

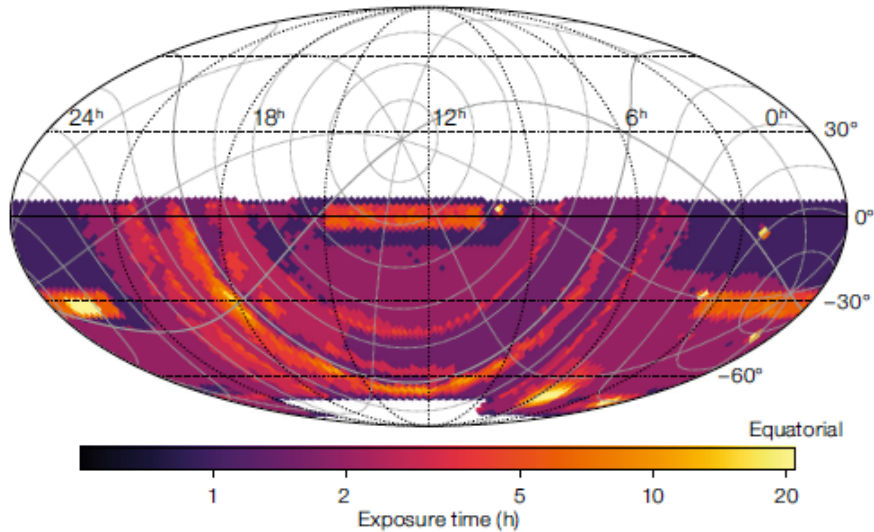
Operation: only surveys defined on 5 years basis/shared FoV

Starting operations: late 2022

(de Jong et al. 2019)

# 4MOST call for community surveys

70% of fiber-hours on consortium surveys  
(no surveys on young stars)



Both consortium and  
community are public surveys

Call for community surveys

Observing time: 30% of fiber-hours (LR =  $4.8 \times 10^6$   
fiber-hours, HR =  $2.4 \times 10^6$  fiber-hours)

Call for Lol: Q4 2019

Call for Proposal: Q2 2020

Survey mode: **Participating** or non-Participating

Participating surveys

- Shared FoV
- Common observation preparation
- Sharing 1-d spectra
- Fully integrated approach

# First unbiased spectroscopic survey of young stars in the solar neighbourhood

## Science goals

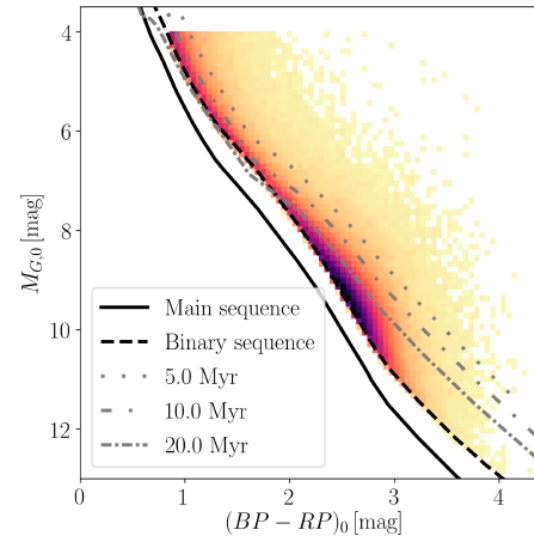
1. Reconstructing the star formation history of the solar neighbourhood
2. Formation and evolution of star clusters and association
3. Origin and properties of nearby associations
4. Open questions in Pre-Main sequence stellar evolution

## Survey Concept and target selection

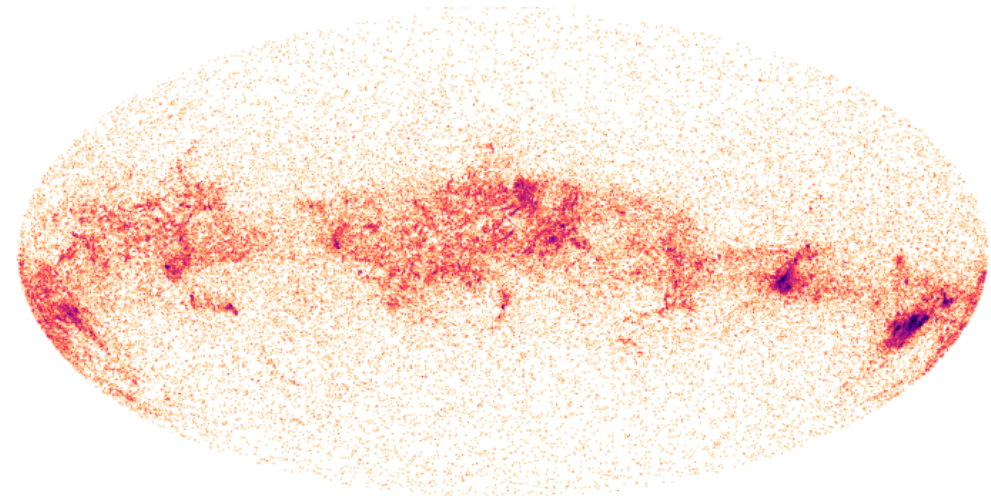
Optical spectroscopic survey of PMS stars within 500 pc selected by color-absolute magnitude diagrams + e-rosita x-ray fluxes or TESS periods

## Astrophysical parameters

RVs,  $V \sin i$ ,  $\log g$ ,  $T_{\text{eff}}$ , activity indicators, accretion indicators, abundances



(Zari et al. 2018)



# The Team

PI: G. Sacco

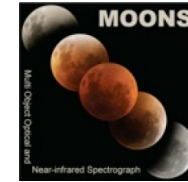
Co-I: 30+ mostly European



*Wide experience in mining Gaia data*



*Key roles in the management, target selection, and spectral analysis for the Gaia-ESO survey*

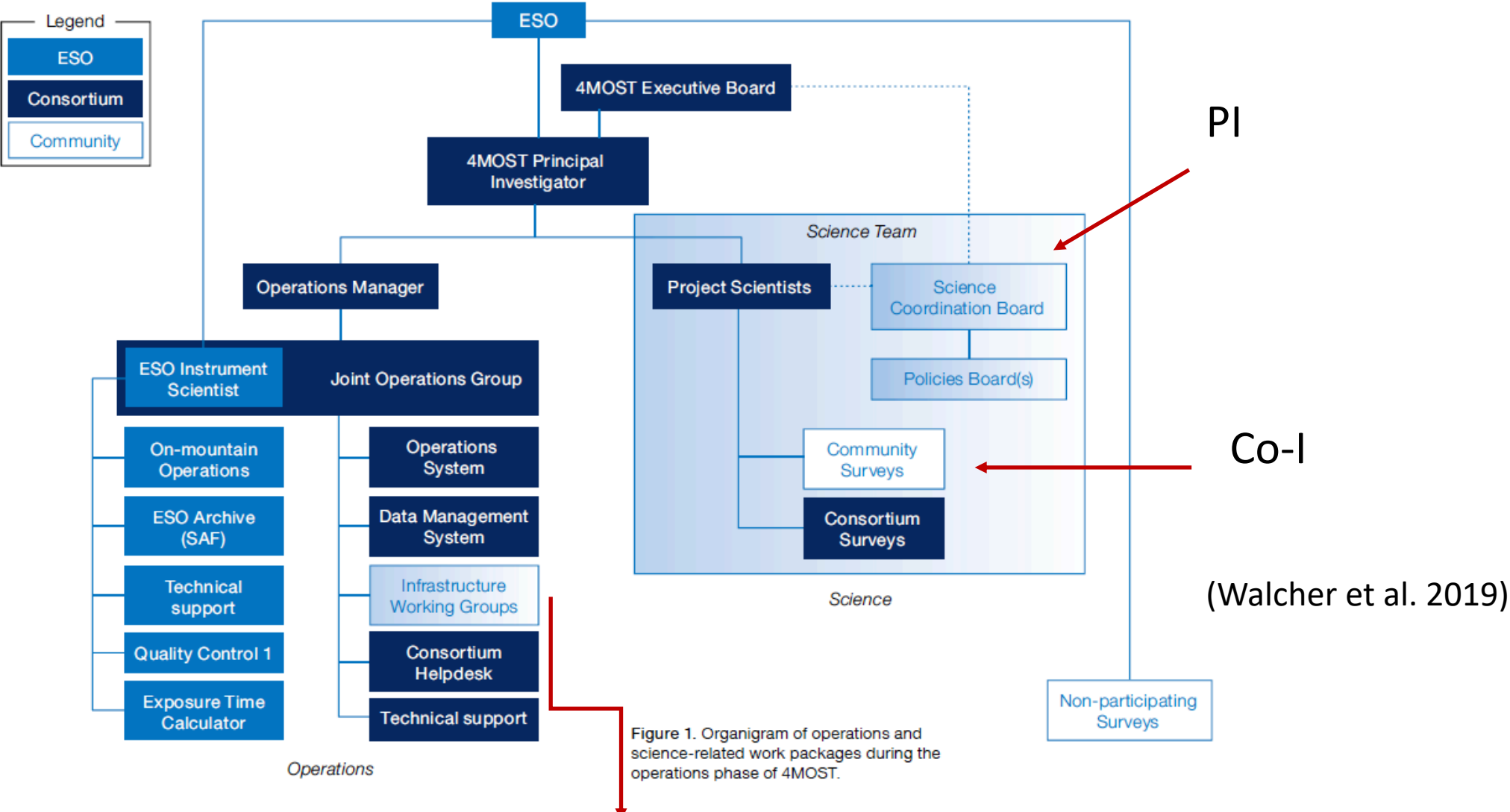


*Team members involved in main surveys of PMS stars*

## INAF Involvement (for the moment)

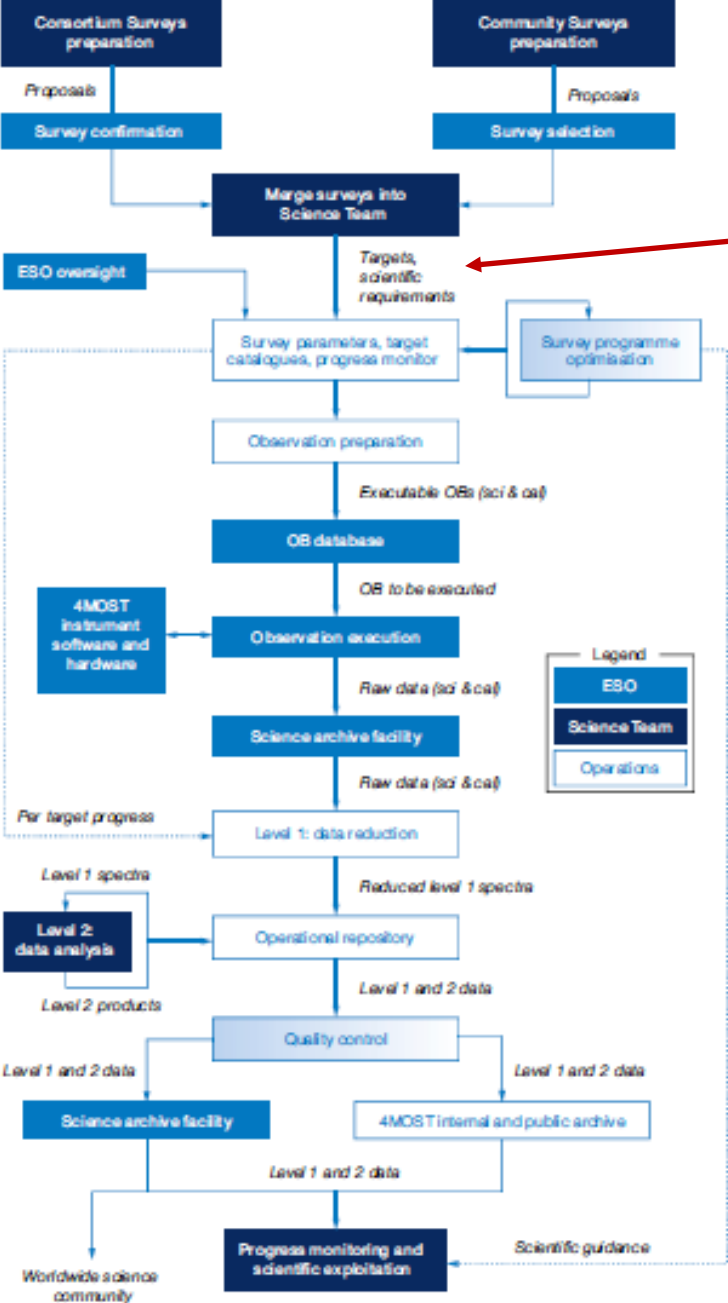
- 10 Co-I based in Arcetri, OAPA, OACT
- Leading role in spectral analysis

# Role of the team in the 4MOST consortium



Co-Is involved in target selection and spectral analysis

# Role of the team in the 4MOST work and data flow



Target selection team

Spectral analysis team

(Walcher et al. 2019)

# The role of the laboratory: supporting the spectral analysis

## Challenges of the spectral analysis of PMS stars

- Subtracting the diffuse nebular emission
- Decoupling photospheric emission from the emission due to accretion shock
- Automatic measurements of accretion and activity indicators
- Effect of activity on stellar parameters determinations



General issues for spectroscopy of young stars. Solutions to these issue can have a wider impact on the field



# The role of the laboratory: a database for young stars in the solar neighbourhood

