



# Ground-Based Observations for Gaia (GBOG)



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Gaia is an ambitious space astrometry mission of ESA the main objective of which is to map the sky in astrometry down to  $V=20$  mag with unprecedented accuracy. Additionally, photometry of all objects and spectroscopy down to  $V=17$  will be obtained. The final catalogue will include distances, motions and astrophysical parameters of one billion stars, a fundamental dataset for unravelling the structure, formation and evolution of our Milky Way.

The challenging task of the data processing is under the responsibility of 320 scientists from 15 countries organised in the DPAC consortium: a major project for the European astronomical community

The Gaia data processing requires reference data in photometry and spectroscopy in order to tie the instrumental system to physical units.

The GBOG WG is responsible for the coordination of the joint ground-based observing efforts to collect the auxiliary data mandatory for Gaia's calibrations.

**Spectrophotometric calibration :** collect the absolute fluxes of 250 spectrophotometric standard stars at 1% accuracy within 330-1050 nm and monitor them for variability  
Facilities : REM/ROSS+REMIR, TNG/DOLORES, San Pedro Martir 1.5m/LARUCA, CAHA 2.2-m/CAFOS, Loiano 1.52m/BFOSC, (Large Programme on ESO-NTT/EFOSC2 submitted)



**Radial velocity calibration :** qualify 1000 stars as reference to fix the zero point of radial velocities, validate a method of calibration with asteroids, gather ~3500 RV measurements (see poster by Crifo et al.)  
Facilities : OHP/SOPHIE, TBL/NARVAL, Swiss 1.2-m Leonard Euler telescope / CORALIE  
Key-programme supported by PNG and PNPS  
Agreement with Geneva Observatory for the Southern part on CORALIE with support from AS-Gaia



**Calibration of the classification / parametrization algorithms :** establish a grid of reference stars for astrophysical parameter determination across the HR diagram. Correct synthetic spectra.  
Facilities : TBL/NARVAL, (Large Programme on ESO-NTT/EFOSC2 submitted)



- no pre-existing dataset fulfills the Gaia requirements in terms of homogeneity, precision, sky coverage, magnitude range, spectral interval...
- the calibration data must be ready when the data processing will start (2012)

**Calibration fields at the Ecliptic Poles :** assemble astrometry, photometry and spectroscopy in 1 sq. deg around each ecliptic pole for the in-orbit test of the data processing  
Facilities : CFHT/Megaprime, ESO-MPI 2.2m/WFI, (VLT/FLAMES applied for)



- all data and resulting libraries will be made available to the astronomical community and will offer excellent possibilities for various research programmes

**Other on-going or foreseen observing programmes for Gaia :**

- benchmark stars for critical tests of stellar atmosphere models (ESO 3.6m/HARPS, TNG/SARG)
- library of solar analogs for Solar System studies (VLT/UVES)
- primary standards for the flux calibration of RVS spectra 847-874 nm (La Palma 2.5m INT/IDS)
- time-series photometry of specific classes of variable stars (network already in place)
- spectroscopy of asteroids (TNG/DOLORES)
- ICRF link (European VLBI Network, see poster by Bourda et al.)
- optical tracking of the satellite (network to be organised)

- the GBOG observing programmes are mostly long term ones : follow-up observations will continue during the mission to ensure the stability (photometric or spectroscopic) of the sources (facilities needed until 2017)
- the GBOG observing programmes face the problem of being in competition, for the allocation of telescope time, with programmes that are more directly scientifically related
- the GBOG observing programmes have already started with a good support of national facilities but there are still some difficulties covering the southern hemisphere

The GBOG WG is mandated to coordinate observing programmes required to support the Gaia mission. Follow-up ground based observations resulting from Gaia science alerts are not included under this mandate.