

Completion of the GOYA Photometric Survey

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Abstract. The Galaxy Origins and Young Assembly (GOYA) survey is designed to study the formation and evolution of $1 < z < 3$ galaxies with the aim of learning on the epoch and the mechanisms by which galaxies assembled the bulk of their stars and acquired their present structure and dynamics. Since 1998 GOYA has been the scientific driver behind EMIR, an ambitious common-user near-infrared multi-object spectrograph for GranTeCan, and as a result it will benefit from half its guaranteed time. In preparation for the exploitation of EMIR, in 2000 we started a deep near-infrared photometric survey, for sample selection and characterisation. Now that this research has reached its final stages, we report here on its current status and its finalisation plans. Overall, this survey has images of ~ 0.5 square degrees of high-latitude sky to limiting AB magnitude $K_s = 23.7$ ($3\text{-}\sigma$, $1''$ aperture) and corresponding depths at U, B, V, R, I and J . The sample of sources obtained is being extended to include fields available to Gemini-S, since a recent collaboration with the Flamingos-2 Early Science Survey Team grants GOYA privileged access to this pioneering near-infrared multi-object spectrograph.

1. Summary

The GOYA team has acknowledged the importance of measuring the dynamic and stellar mass, the star-formation rate, the abundances of heavy elements and the super-massive black-hole accretion rates in distant galaxies as the four main functions which will tell us how galaxies form and evolve. For these studies it has gathered over 40 nights of guaranteed time on two of the world's most advanced NIR spectrographs, EMIR on GTC (2008-10) and Flamingos-2 on Gemini-S (2007-08).

EMIR is a $0.9\text{--}2.5\ \mu\text{m}$ MOS which is unique in many regards. Amongst its most relevant features we single out a robotic reconfigurable cryogenic multi-slit mask acting as field selector, and a set of dispersive elements formed by the combination of high quality diffraction grating and conventional prisms which allow resolutions of $R > 4000$ in Z, H, J, K (see Garzón et al. (2006) for further details). In recent months, GOYA has established a close collaboration with the Flamingos-2 Early Science Survey team of the University of Florida and will benefit from a minimum of 7 nights of guaranteed time during 2007-08 with Flamingos-2. This is a fully cryogenic, 1 to 2.5 micron multi-object spectrom-

Table 1. Extent of the GOYA Photometric Survey. Note that the limiting magnitude is the K_s band measured in the AB photometric system at $S/N=3$ and a $FWHM=1''$. Also that the area is given in squared arc-minutes. The fields targeted for the “deep” slice are the Groth Strip ($175''^2$), Groth_O2k ($750''^2$), GOODS-N ($250''^2$), and SA-68 ($150''^2$)

Survey	Bands	Limiting Magnitude	Area
Ultra Deep (Groth-Westfall)	UBVIJK	23.7	20
Deep	UBVRIJK	22.7	1300
Shallow (Groth Flanking Fields)	(J),K	~ 21.7	1000

eter and wide field imager for the Gemini-S, to start commissioning in 2007 Eikenberry et al. (2006).

With these instruments it is estimated that GOYA will obtain 10^4 near-infrared spectra. In preparation for a fruitful scientific exploitation, the GOYA team has been conducting since 2000 a deep NIR imaging program (bands J, K with corresponding deep optical data) for sample selection and characterisation, which covers over 0.5 deg^2 at typical magnitudes of $K_s < 22.5$ (Table 1). As of today, the data-acquisition campaign is at a stage of being 80% complete, while the data reduction is completed at the 70% level. Recently our source catalogs are being expanded to include sources available to Flamingos-2 and Spitzer infrared data.

This survey is proving good for $0.5 < z < 2$ science and several studies on early-type galaxy formation have stemmed from it: SED-based stellar mass estimates Cristóbal (2005); B - and K -band population synthesis evolutionary models Eliche-Moral et al. (2006); bulge/disk relationships (Dominguez et al. in prep.); galaxy fusion rate *vs.* z ; extremely red objects; K -band luminosity function; photo- z distributions; census of mergers; obscured X-ray AGN Miyaji et al. (2004); *etc.*

We are committed to publishing standardised photometric database catalogs of sources for public access. We are working in a timeline where a beta version of the photometric survey catalogs including all observed data in fields Groth-Westfall, Groth Strip, Groth Flanking Fields, GOODS-N, plus datamined info on CDFS and VIRMOS-2h, will be available by Jan 2007. This catalogs will be debugged in the following months and an alpha version for internal use is planned for Jul 2007. Keeping on schedule, a public release of the data should follow as early as Jan 2008 in the frame of the GOYA Archive. More information on the project can be obtained by contacting the authors or at <http://www.iac.es/project/GOYAiac/GOYAiac.html>.

References

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