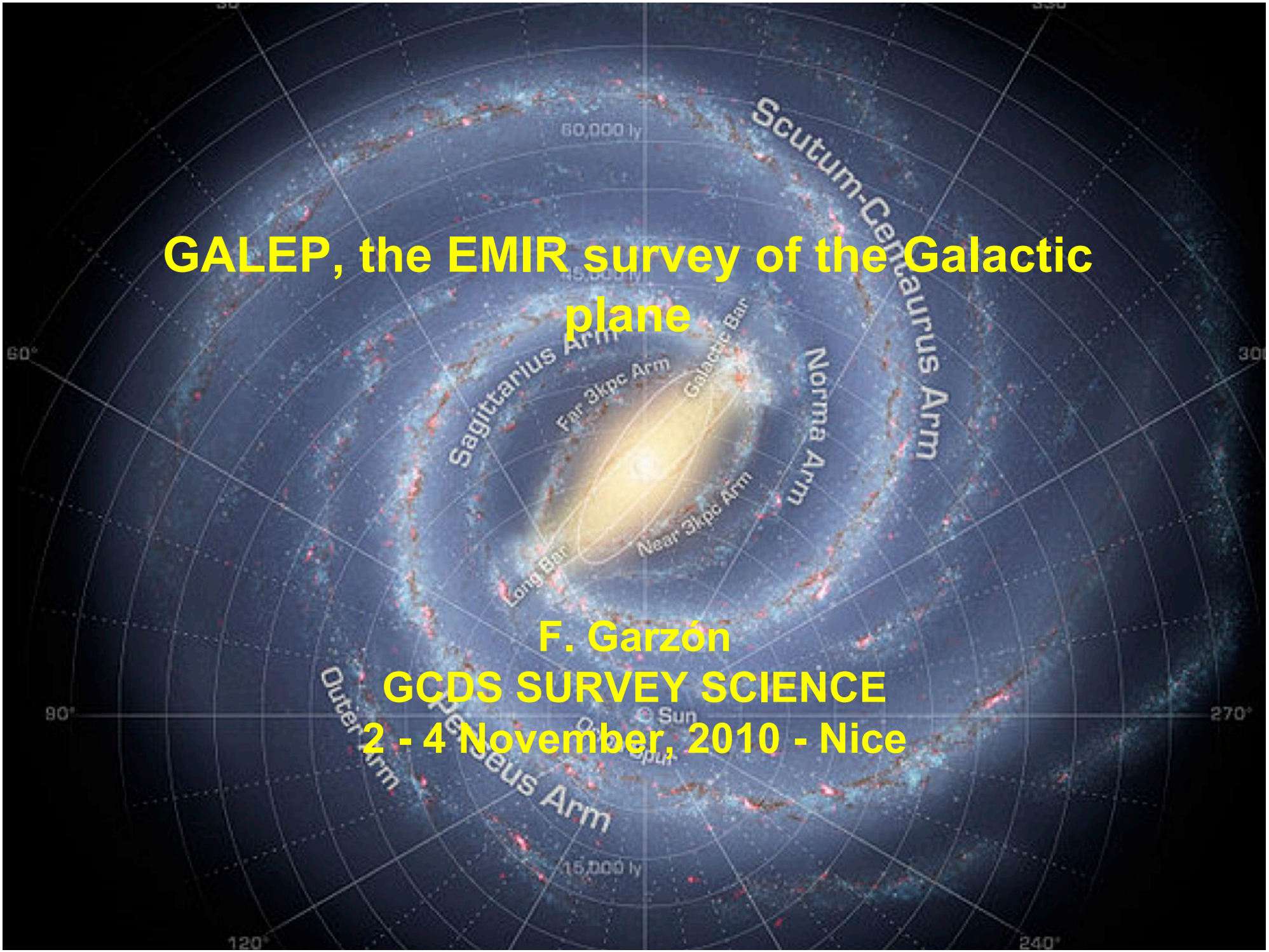


GALEP, the EMIR survey of the Galactic plane

F. Garzón

GCDS SURVEY SCIENCE

2 - 4 November, 2010 - Nice

Summary

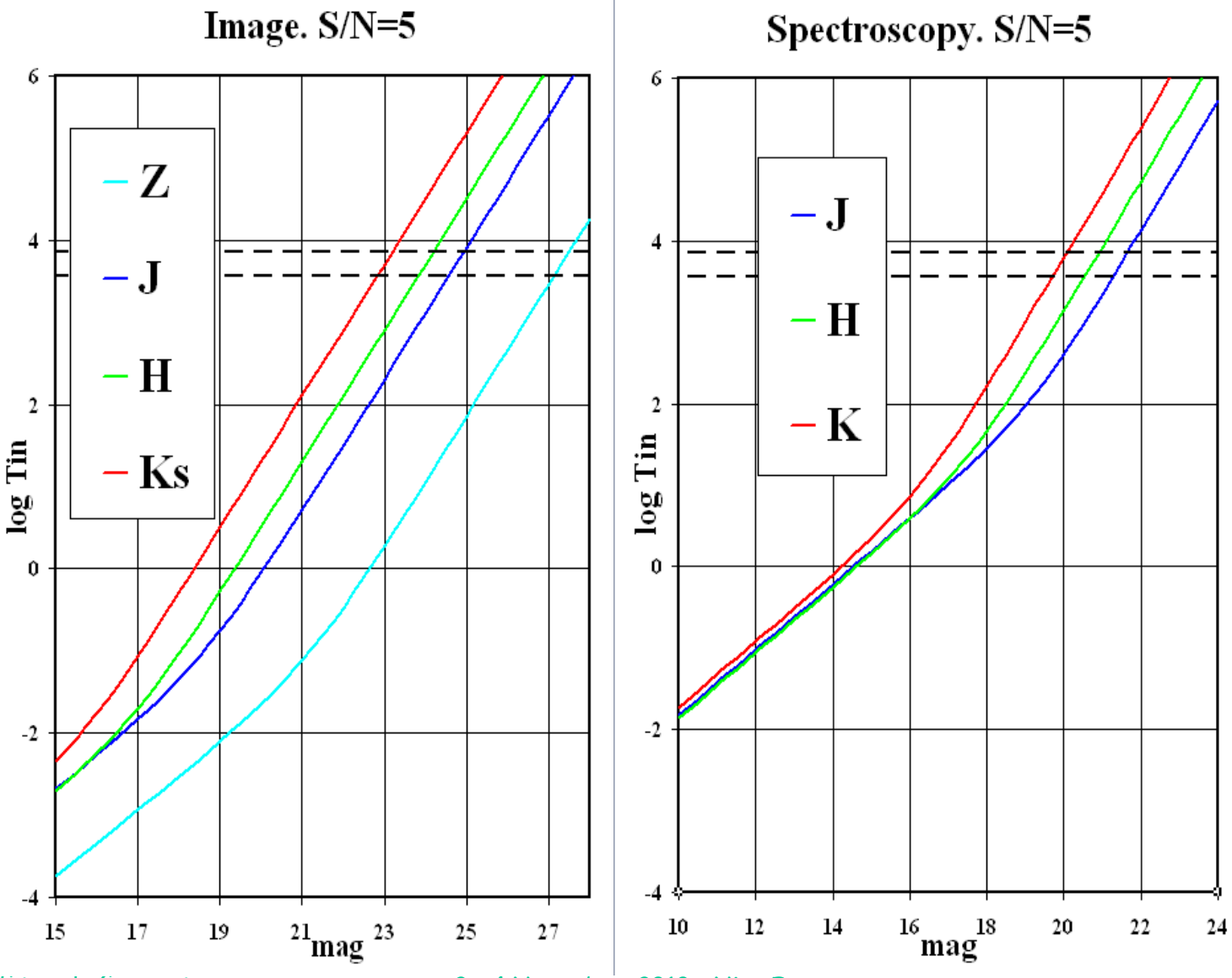
- The instrument: EMIR
  - description
  - status & schedule
- The project: GALEP
  - motivation
  - the case
  - observational strategy

EMIR: general description

- EMIR is a NIR camera and multi-object spectrograph, which will be a common user instrument for GTC

Spectral Range	0.9-2.5μm[1.1-2.5μm]	MOS mode	
Top priority	MOS in K band	FOV	6,7x4 arcmin (55 slitlets)
Spectral Resol.	5000,4250,4000 (JHK)	Sensitivity	K~20.1 in 2h @ S/N=5 (continuum)
Spectral coverage	1 single window/exp.		$1.4x10^{-18}$erg/s/cm^2/Å @ S/N=6 (line)
Detector	HAWAI2 2048^2	Image mode	
Plate Scale	0.2 arcsec/px	FOV	6.7x6.7 arcmin
Image quality	θ_{80} < 0.3 arcsec	Sensitivity	K~22.8 in 1h @ S/N=5 in 0.6 arcsec aperture

Expected performances



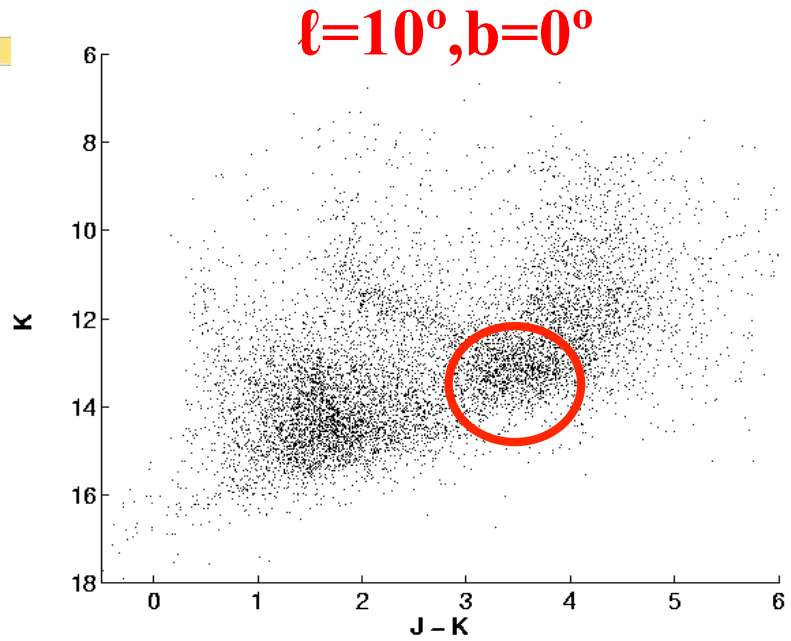
EMIR: status & schedule

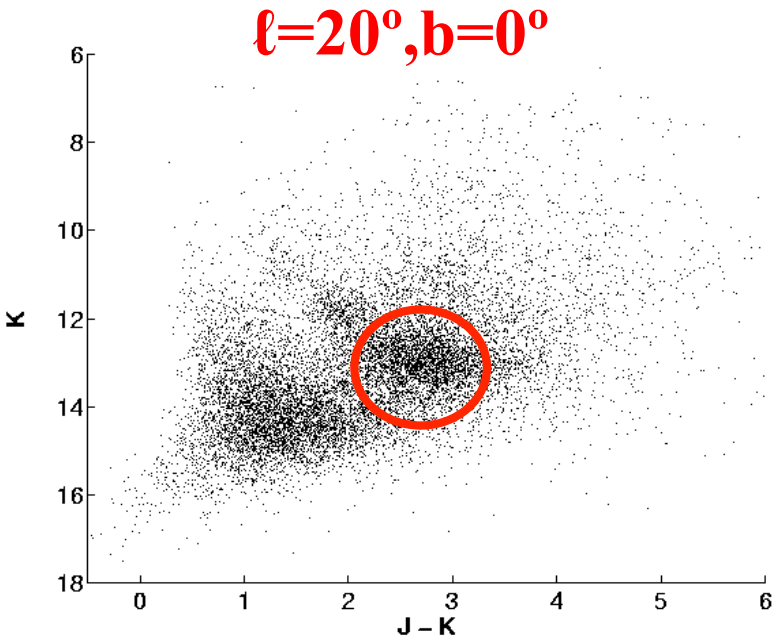
- many problems with developments over the past years
  - mostly associated to lack of manpower
  - the instrument is delayed
- new technical staff
  - trying to recover the impulse
- AIV @ system level should start in 2011
- First light in 2012 / 2013

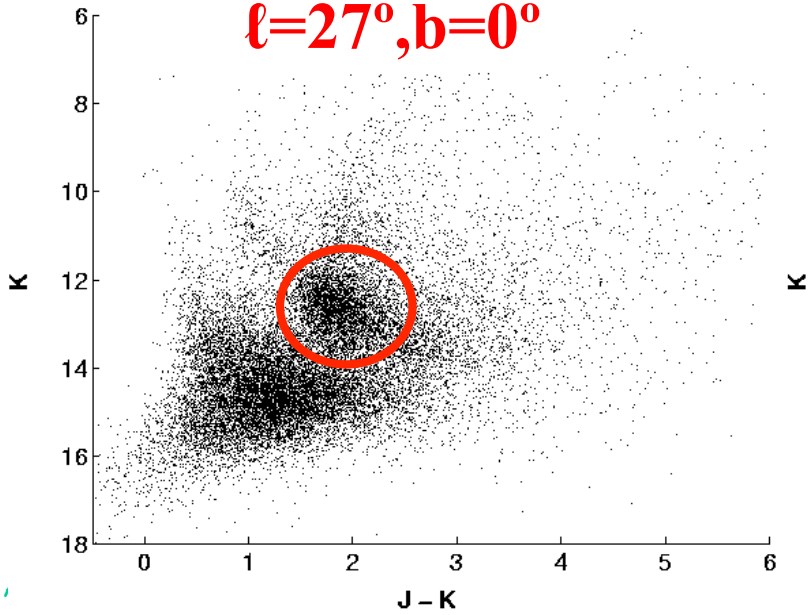
GALEP: the motivation

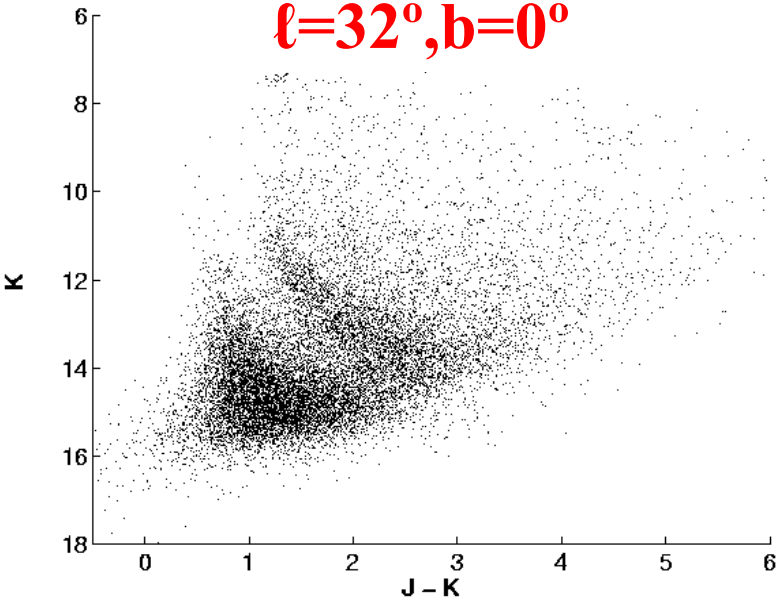
- intense effort in mapping the stellar content of the Galaxy:
  - NIR star counts ground based surveys: DENIS, 2MASS, UKIDSS, VISTA, …
  - NIR & MIR star counts and integrated flux space surveys: DIRBE, MSX, GLIMPSE, ….
- contributed to enlarge our knowledge of the galactic stellar distribution
- spectroscopic follow–up from a well populated photometric parameter space.

GALEP: the motivation









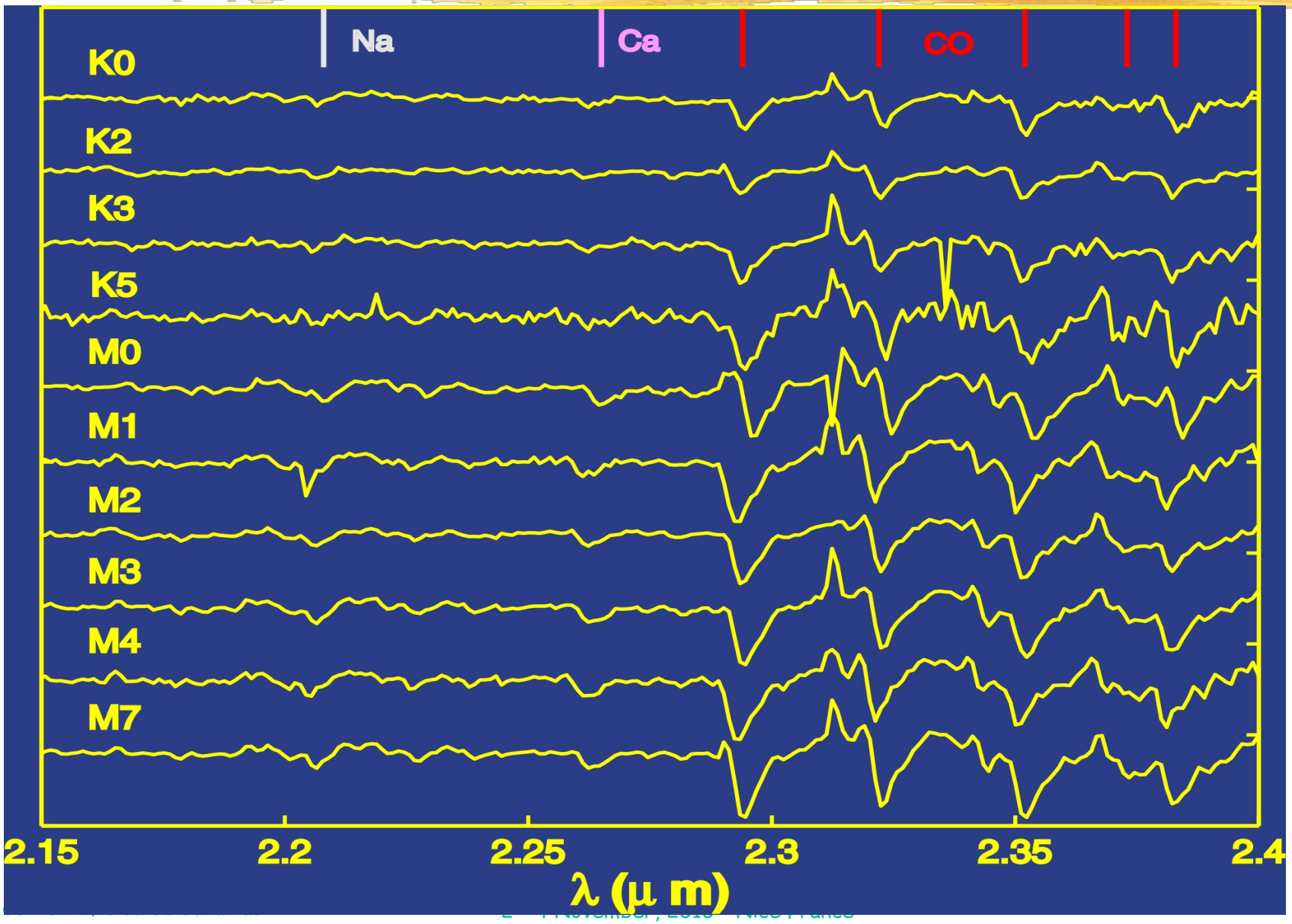
GALEP: the case

- Use EMIR to obtain near IR spectroscopy of many thousands sources
  - vast majority located in the inner Galaxy
  - selected from their position on IR colour-magnitude diagrams
  - will include disc, bar, bulge and ring sources.
- Main aim is to accurately classify the sources
  - to provide a better understanding of the redder parts of a infrared CM diagram.
- Tackle ambiguities in the interpretation of structures in the inner Galaxy.

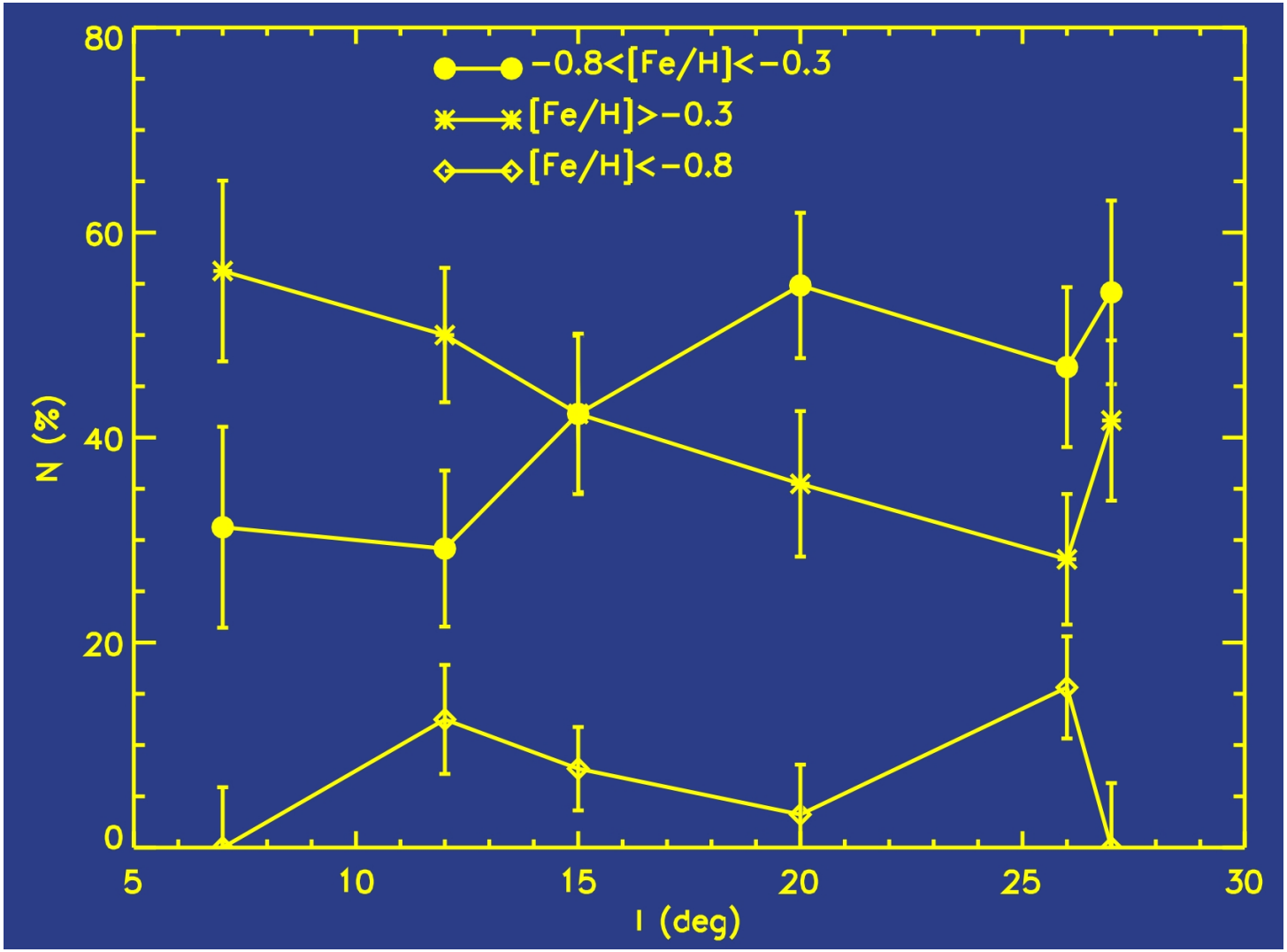
GALEP: the case

- NIR spectra (H & K bands) will allow accurate determination of the spectral type of the sources.
  - series of molecular lines, OH, H_2O and CO
  - metallic lines: Na, Ca, Fe, etc.
  - …
- Features relatively spread out between 1.5 and 2.4 microns
  - much higher resolution is not required.
- The relative strength of these lines coupled with the overall form of the spectra will allow the spectra type to be accurately determined.

GALEP: the case



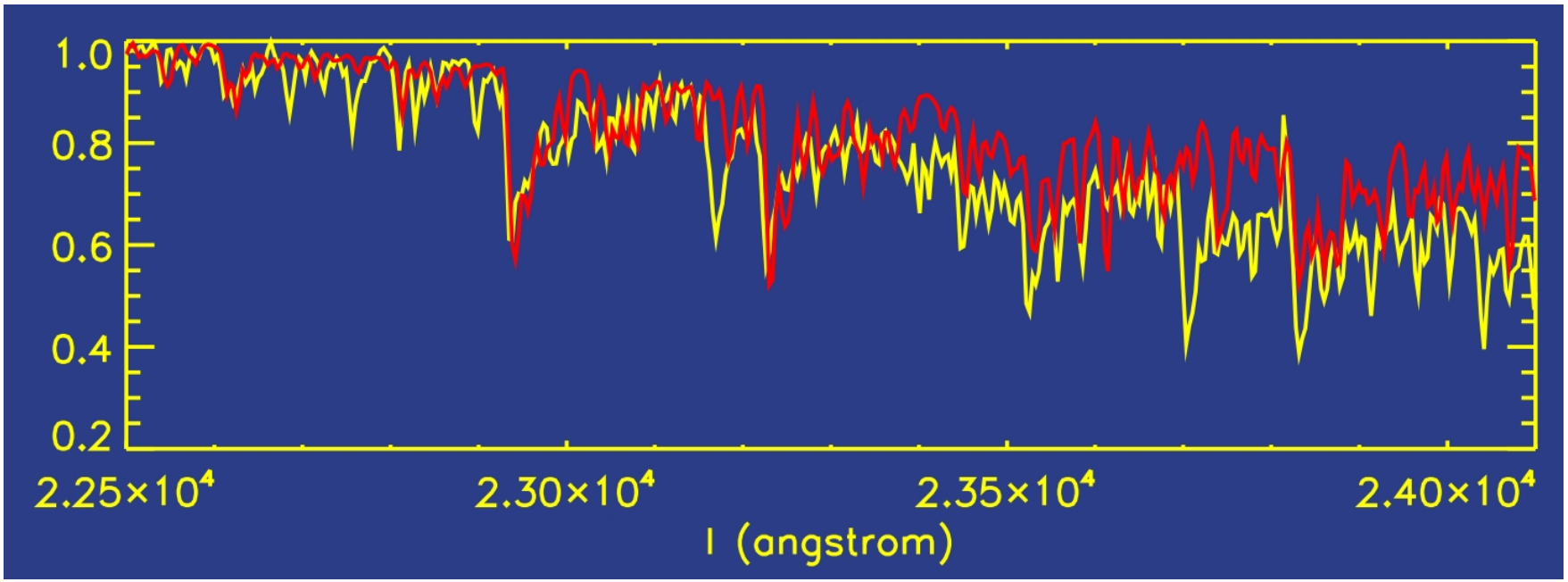
Ongoing preparatory work



2008A&A 479
131G: González-Fernández et al.

Ongoing preparatory work

- Second phase already started: After 3 nights with LIRIS+WHT, we have 90+ spectra at R~2500.
- Using a mesh of PHOENIX models, they will be inverted to derive (Teff, [Fe/H], [α/Fe]) (**BIQUINI**)



GALEP: the case

- Additional goal: the measurement of radial velocities for using kinematics as a tool for classifying the different populations.

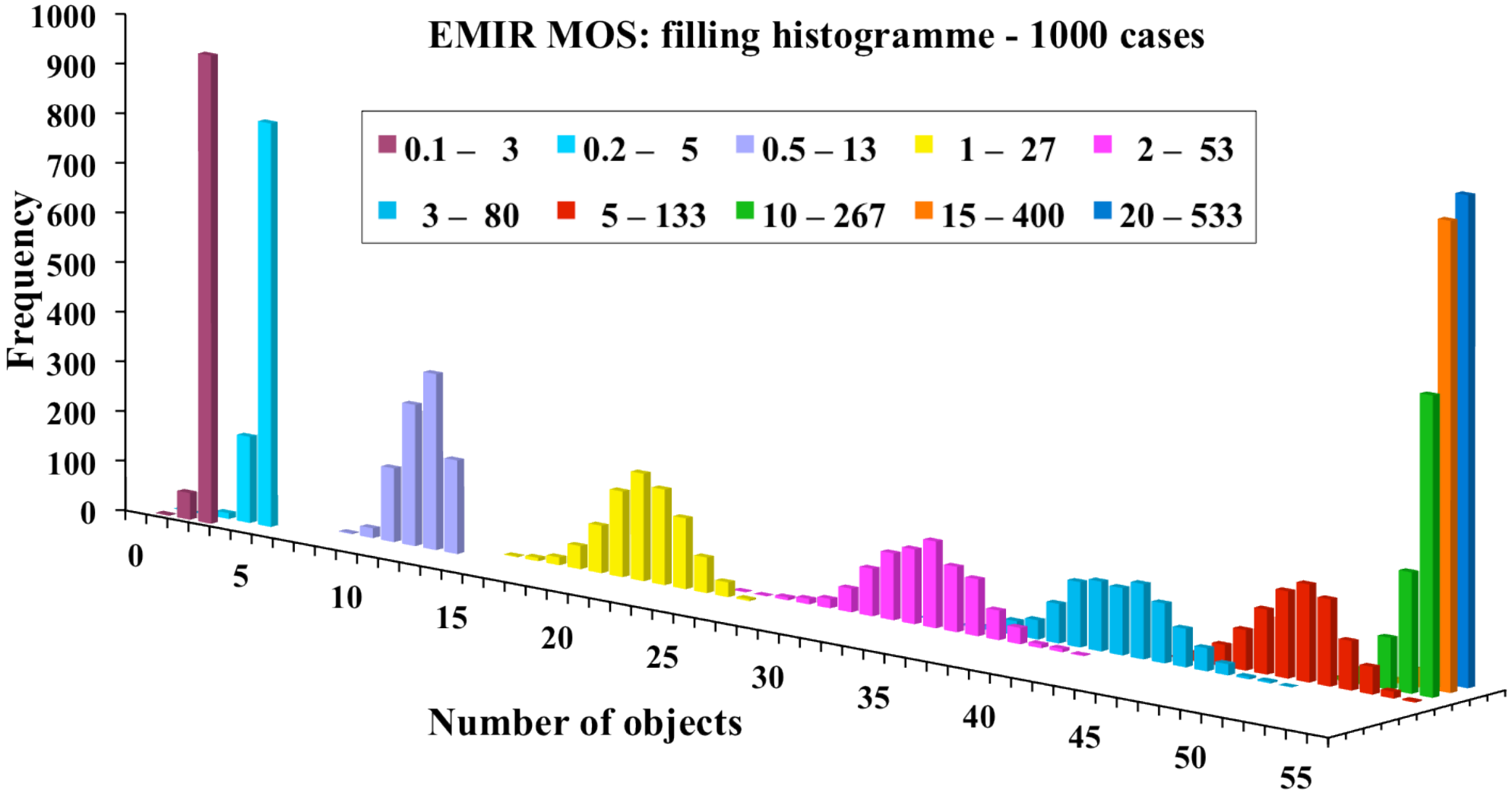
- EMIR will deliver velocity resolutions of 70 and 75 Kms^{-1} (H & K)
  - v_los at the end of the bar ~ 80 Kms^{-1}
  - depending upon instr. stability ➔ ability to measure velocities to 10% of the resolution
    - 7 to 20 km/h
    - high S/N required, but many bright sources
      - narrower slit

GALEP: the project

- A necessary step forward
  - after the large Galactic surveys (optical, NIR, …)
  - before GAIA, as a complement
- Now, the positions of large set of stars in CMDs are known
  - adequate sample selection
  - “blind” configuration of MOS instrument
    - high observational efficiency

GALEP: MOS coverage

GALEP: MOS coverage



GALEP: obs. strategy

Field Positions Area/field	#Fields	#Points./field	#Frames/Point.	#Objs./frame	Total Frames	Total Objects
$0^o<\ell<40^o$, $\|b\|=0^o,0.5^o$ $\Delta\ell=4^o$, 15'x15'	30	8	4	40	960	38400
$40^o<\ell<100^o$, $\|b\|=0^o,0.5^o$ $\Delta\ell=10^o$, 15'x15'	18	8	2	30	288	8640
$100^o<\ell<200^o$, $\|b\|=0^o,0.5^o$ $\Delta\ell=20^o$, 15'x15'	15	8	1	8	120	960
TOTAL	**63**				**1368**	**48000**

GALEP

- Ks < 16.5^{mag}
- H < 18.5 / 19.5^{mag}

Item	Mode	Band	S/N	Int. Time
Peaking-up	Image	*J,H* or K_S	5	5s
Multislit check	Image	*J,H* or K_S	5	5s
MOS measurement	MOS	$H\&K_S$	50	~2000s
			Total	**2000s / 33min**

➔approx. 65 / 70 nights at GTC

Medium term future: MIRADAS

- **MIRADAS is a near-infrared multi-object echelle spectrograph operating at spectral resolution R=20,000 over the 1-2.5 μm bandpass on the GTC**
  - **recently selected as a 2nd generation instrument for the GTC:**
  - **UFlorida, IAC, UB, UCM, IFAE, IEEC, …**
- **Planned for 2016/17**

Medium term future: MIRADAS

