S-PLUS survey

T80S and its survey S-PLUS

Claudia Mendes de Oliveira
on behalf of the S-PLUS collaboration

La Plata, February 16, 2020

Photometry

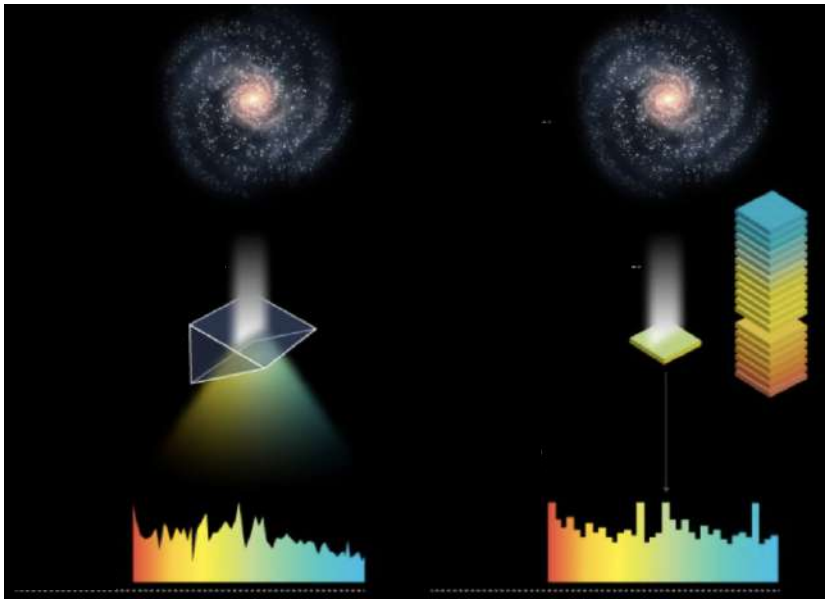
- Unbiased samples
- Faster & cheaper
- Large Volumes
- High number density

vs.

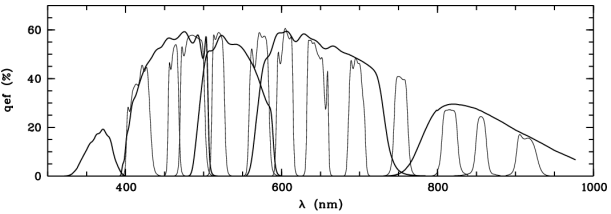
Spectroscopy

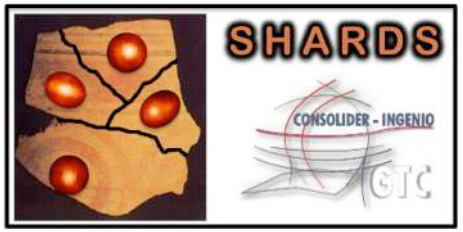
- SEDs of targets
- Precise redshifts

Spectro-Photometry



COMBO-17





ALHAMBRA SURVEY

Multiband surveys

- **S-PLUS: Southern Photometric Local Universe Survey, 9300 sq deg – 0.8m telescope @ OAJ – 12 filters**

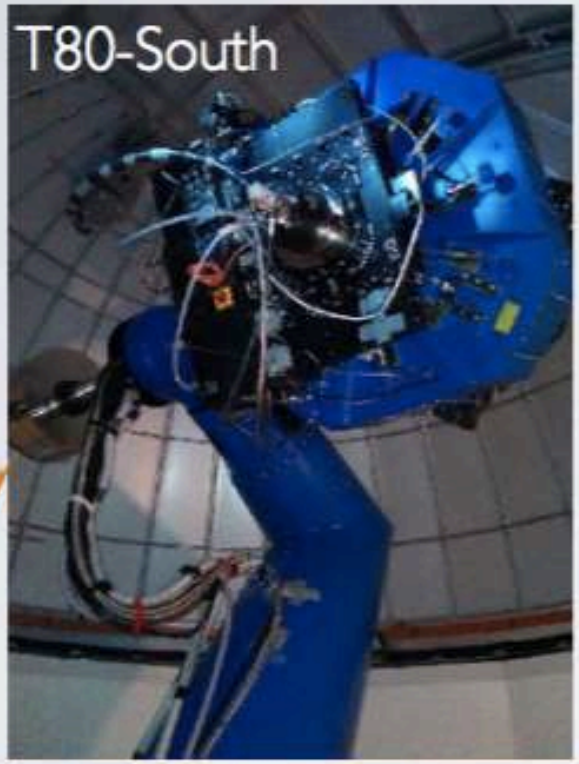
- **J-PLUS: Javalambre Photometric Local Universe Survey 8000 sq deg – 0.8m telescope @OAJ – 12 filters**

- **J-PAS: Javalambre Physics of the Accelerating Universe Astrophysical Survey**
  8000 sq deg – 2.5m tel @ OAJ – 59 filters – Feb 2020

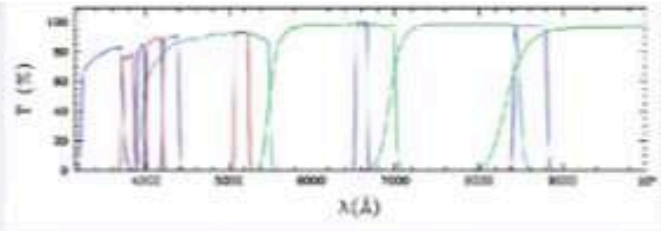
- **S-MAPS: Southern Massive Astrophysical Panchromatic survey – copy of J-PAS in the South - Not funded**

Two surveys, North and South

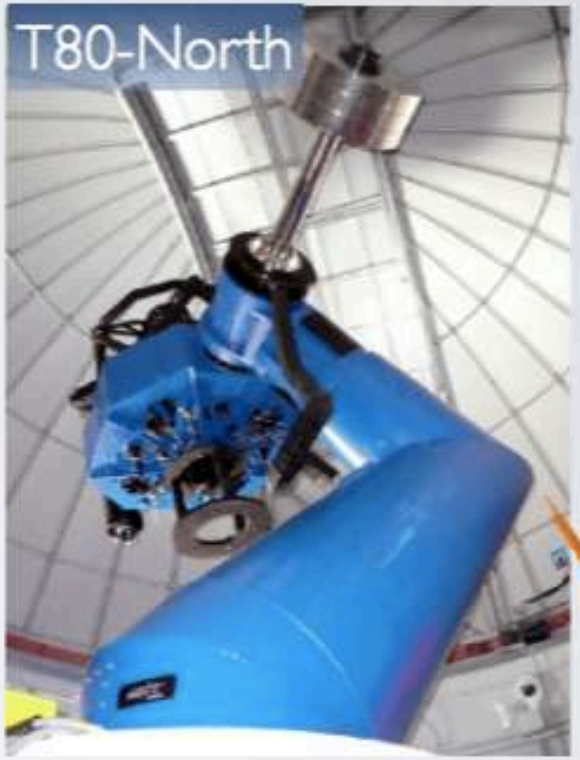
S-PLUS **P.I. CMdO**



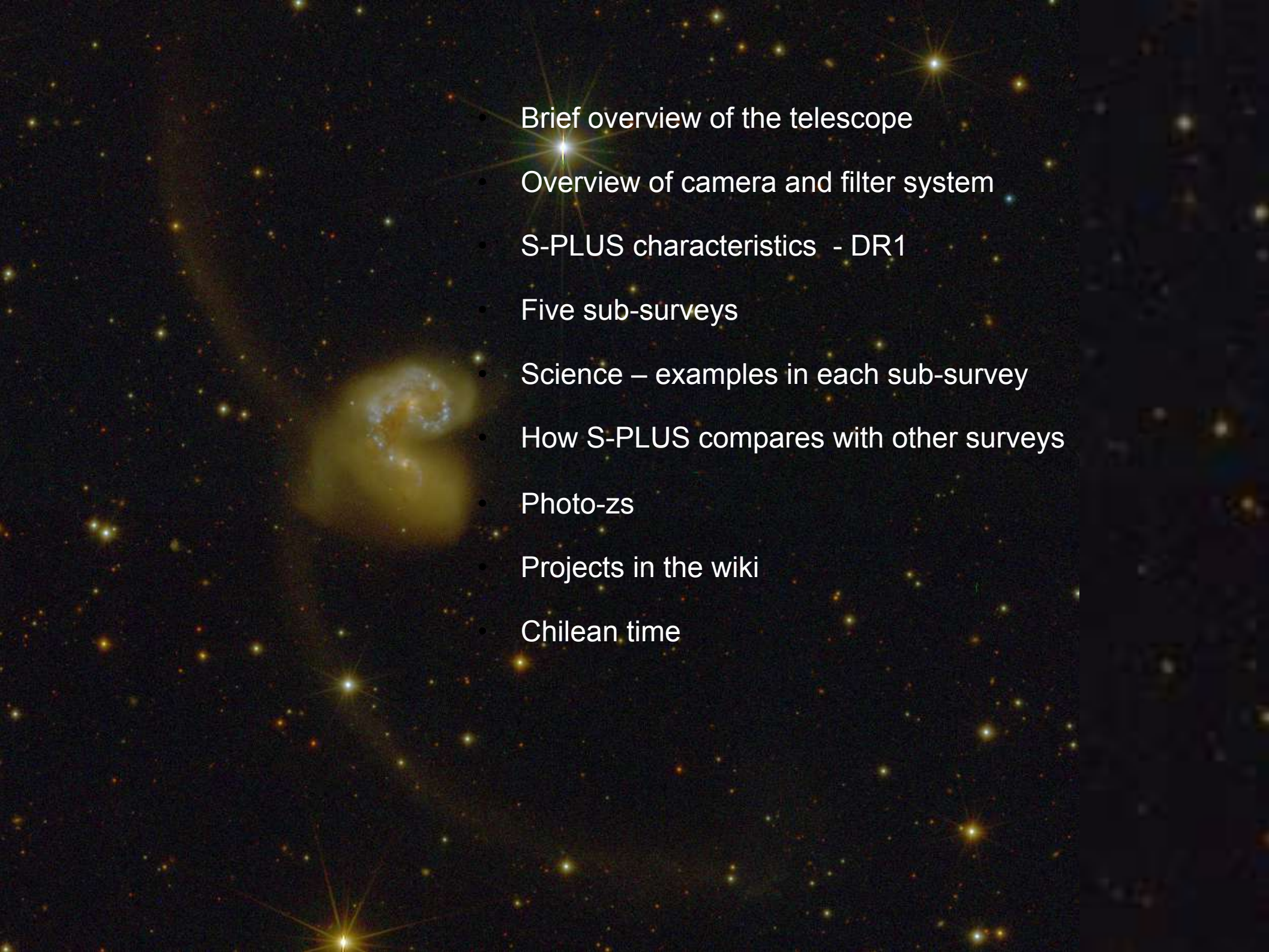
- Two identical telescopes and cameras
- Mirror: 0.8m
- Field of view: 1.4 x 1.4 deg
- 7 narrow and 5 broad bands



J-PLUS **P.I. Javier Cenarro**



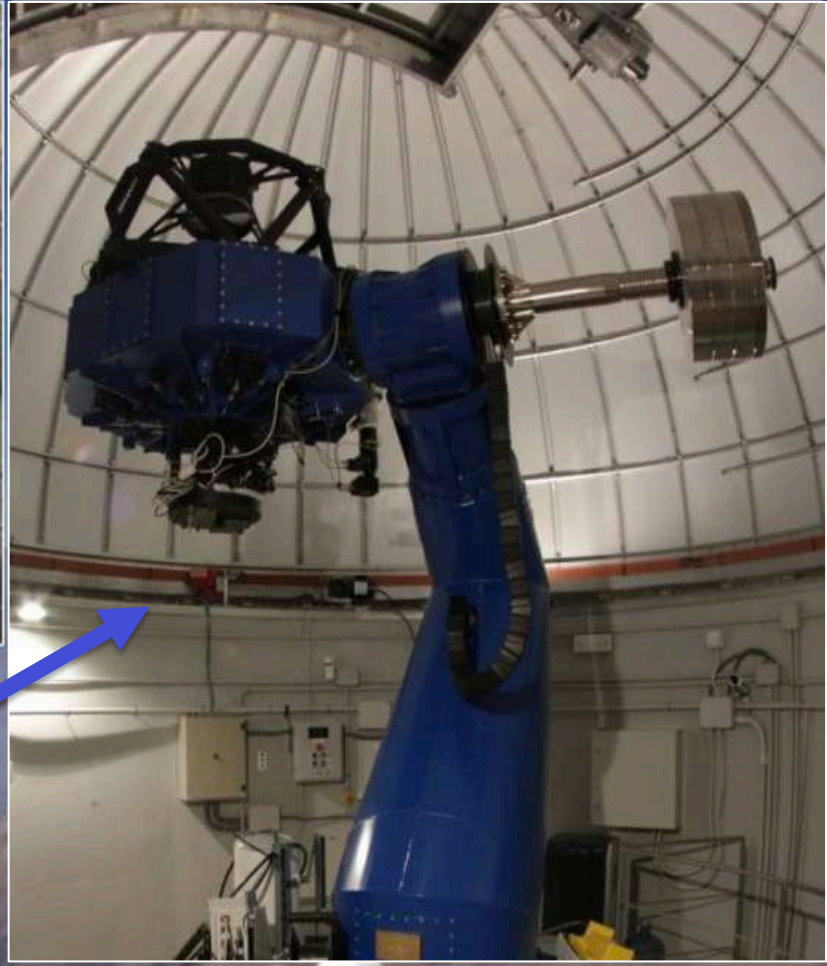
Fabricated by AMOS/ASTELCO



- Brief overview of the telescope
- Overview of camera and filter system
- S-PLUS characteristics - DR1
- Five sub-surveys
- Science – examples in each sub-survey
- How S-PLUS compares with other surveys
- Photo-zs
- Projects in the wiki
- Chilean time


Puerto Rico
Mar Caribe
Nicaragua
Venezuela
Guyana
Colombia
Surinam
Ecuador
Brasil
Perú
Bolivia
Paraguay
Chile
Uruguay
Argentina
La Serena

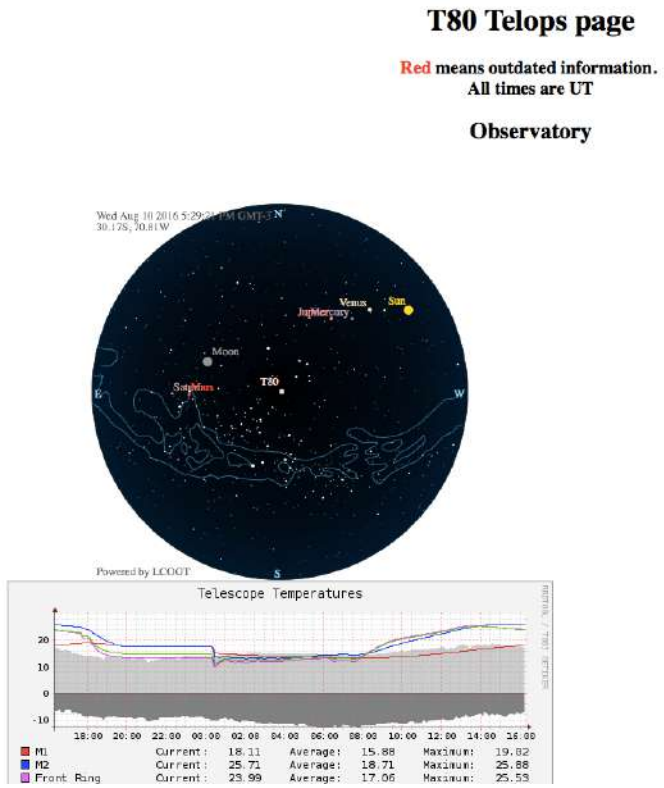

T80S
Cerro Tololo (Chile)

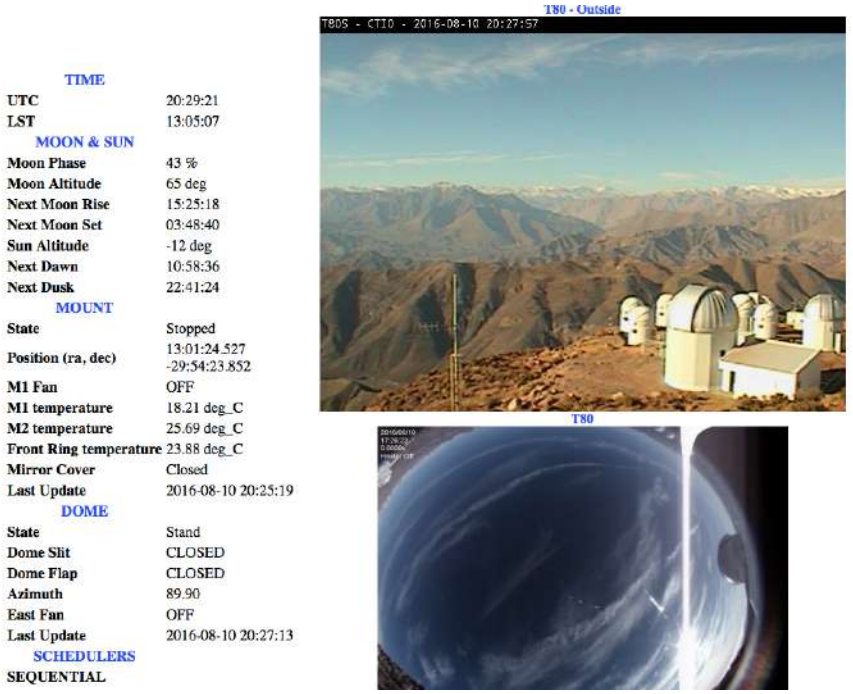


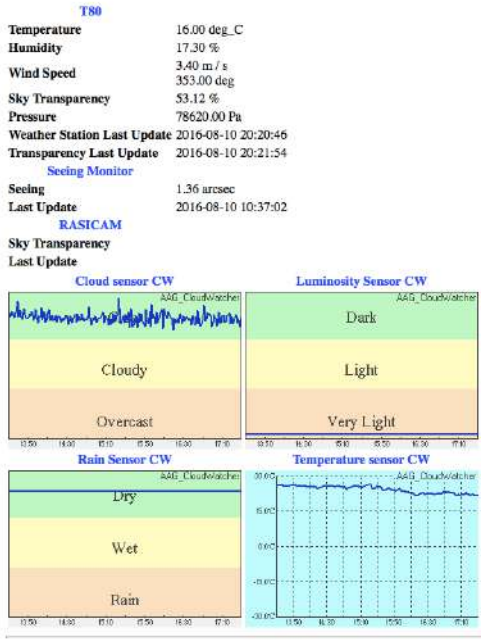

T80-South

Temperature (indoor, outdoor, telescope, mirrors, camera), Dew point , Humidity, Cloud sensor, Sky brightness, Rain sensor, Pressure, All sky camera

T80S TelOps Site







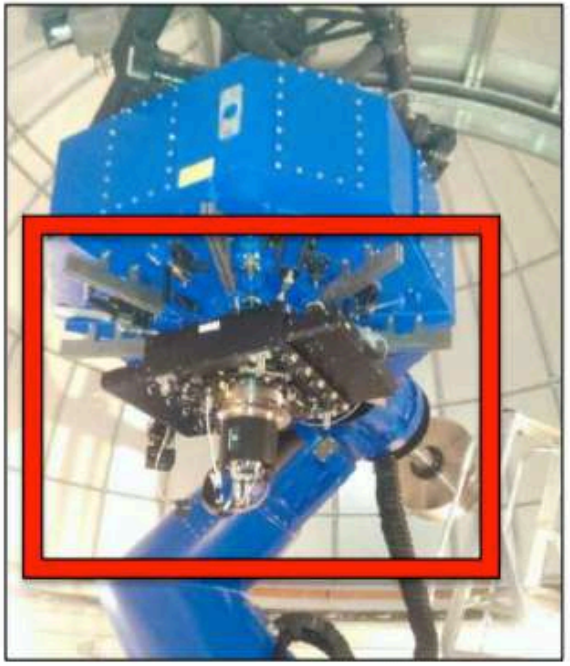
Telescope and dome totally automated

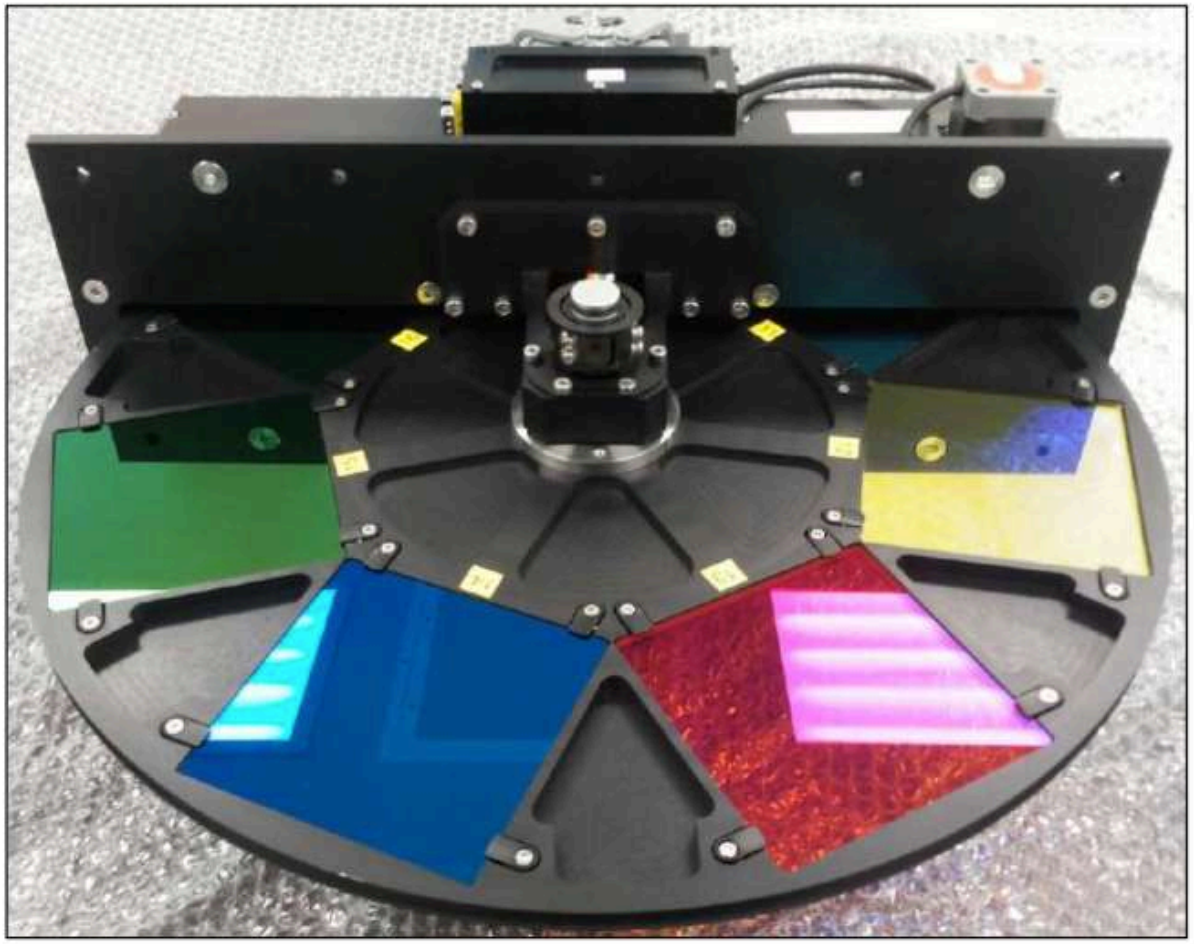
Different surveys in a given night depending on weather and seeing conditions

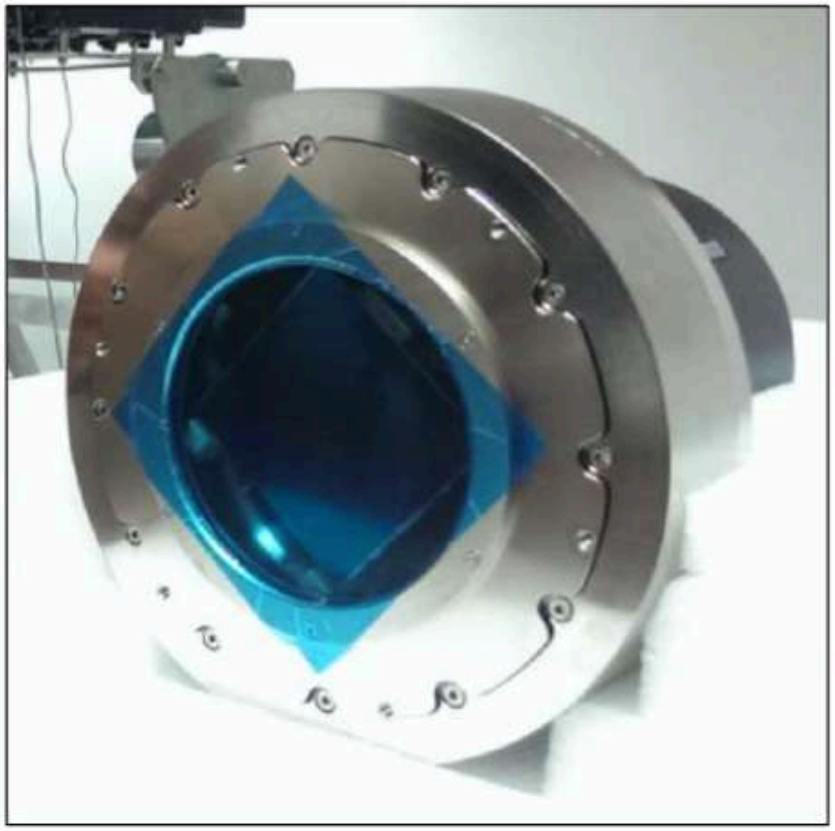
Pre-reduction done immediately after the object is observed, final reduction takes 1-4 weeks

T80cam

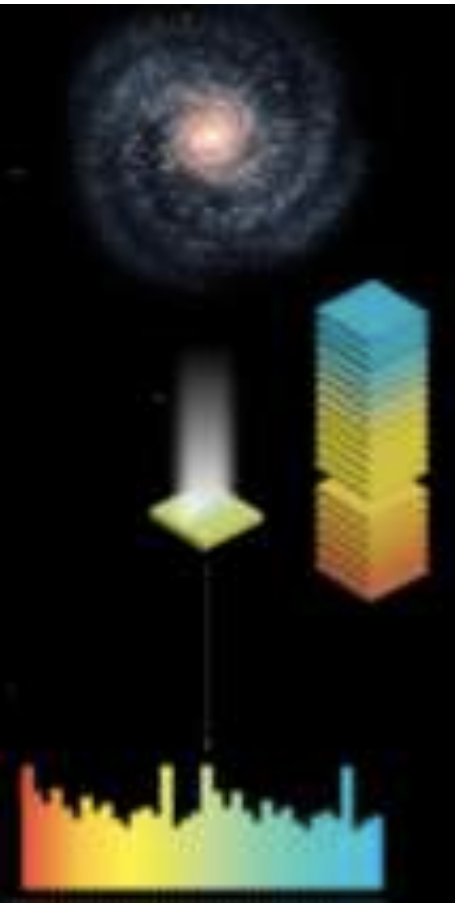
- CCD: 9.2k x 9.2k
- Pixel-size = 10μm
- Pixel-scale = 0.55″
- Filter-wheels = 2 x 6

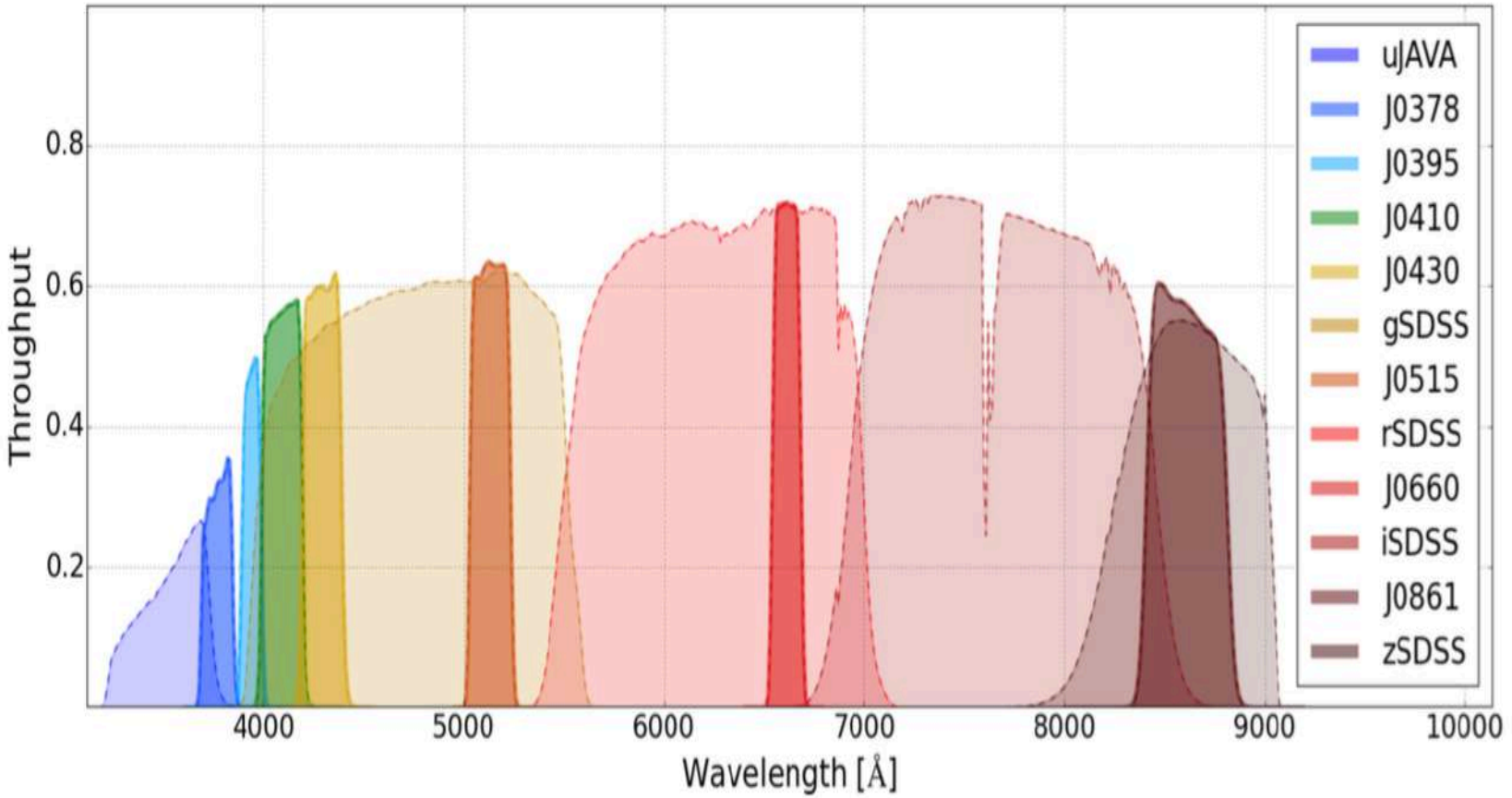




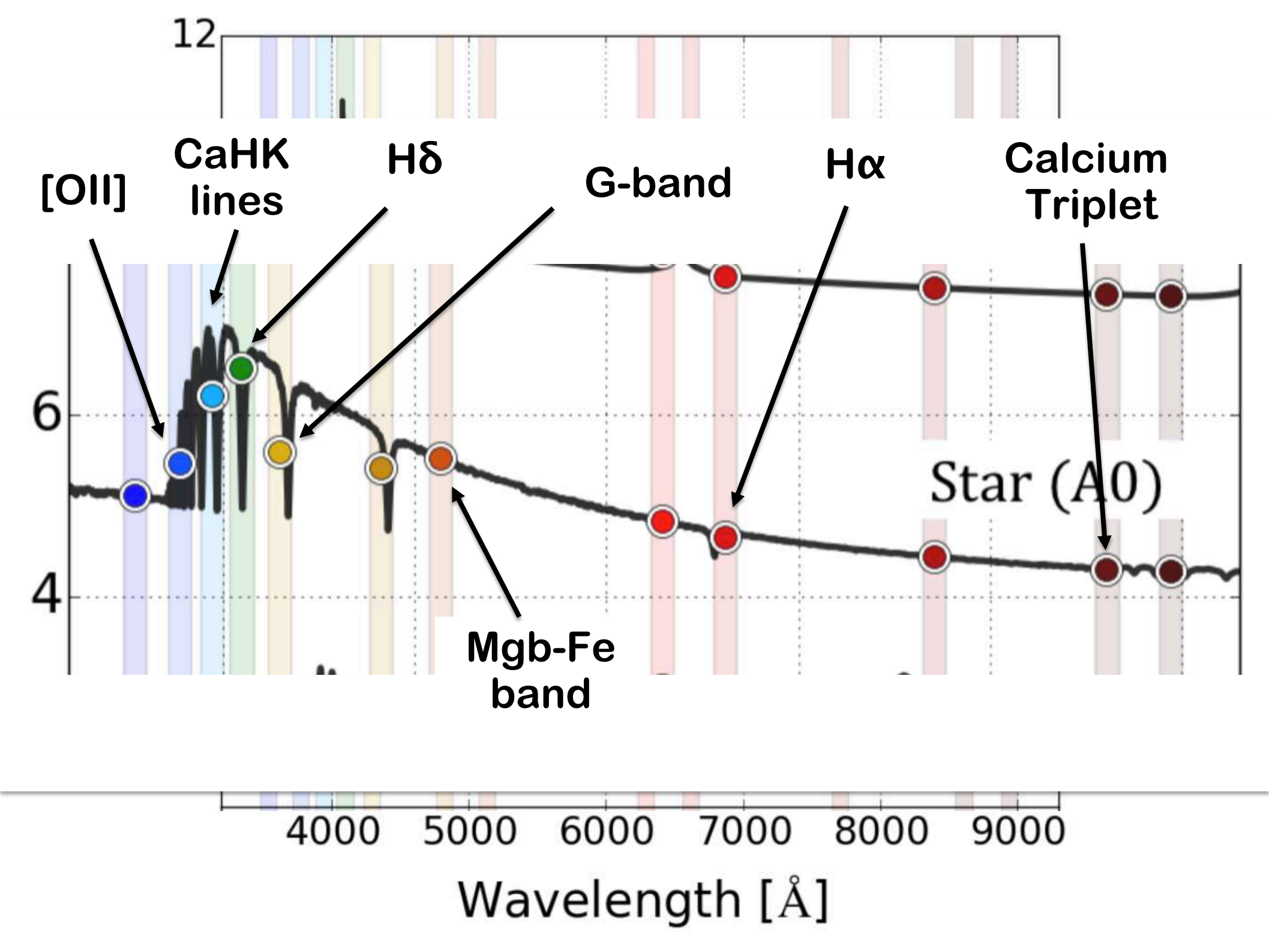


Javalambre filter system

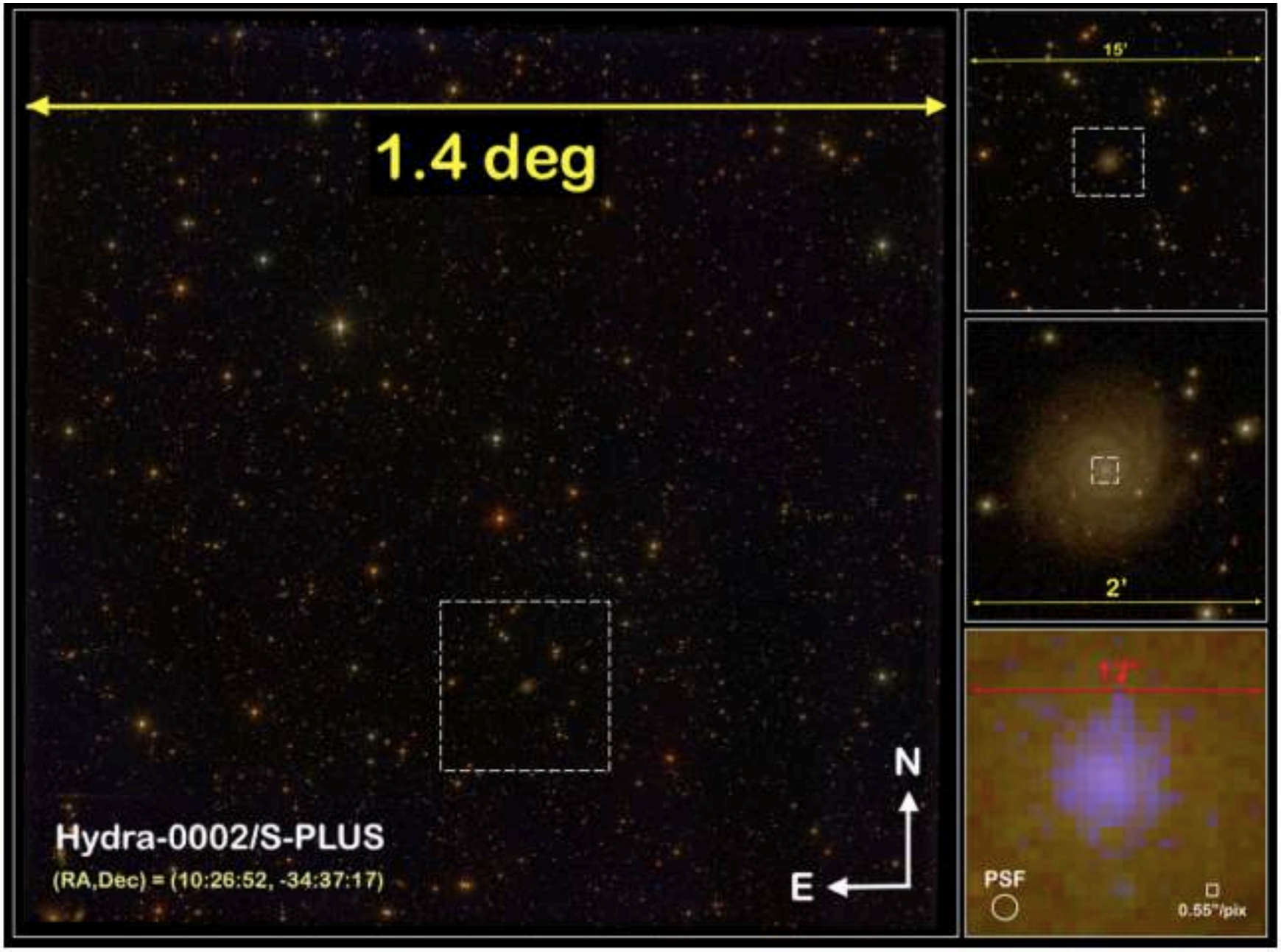


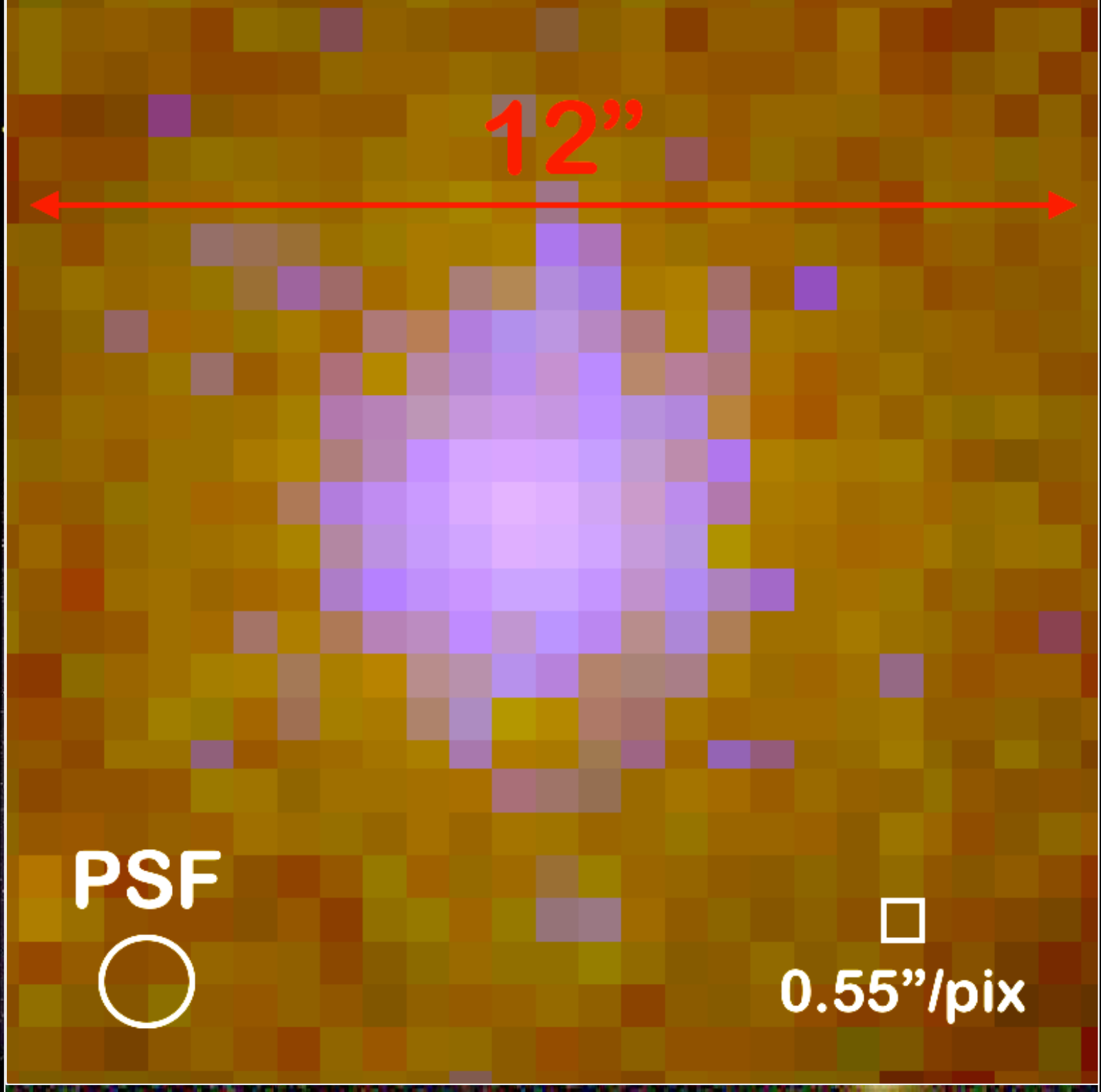


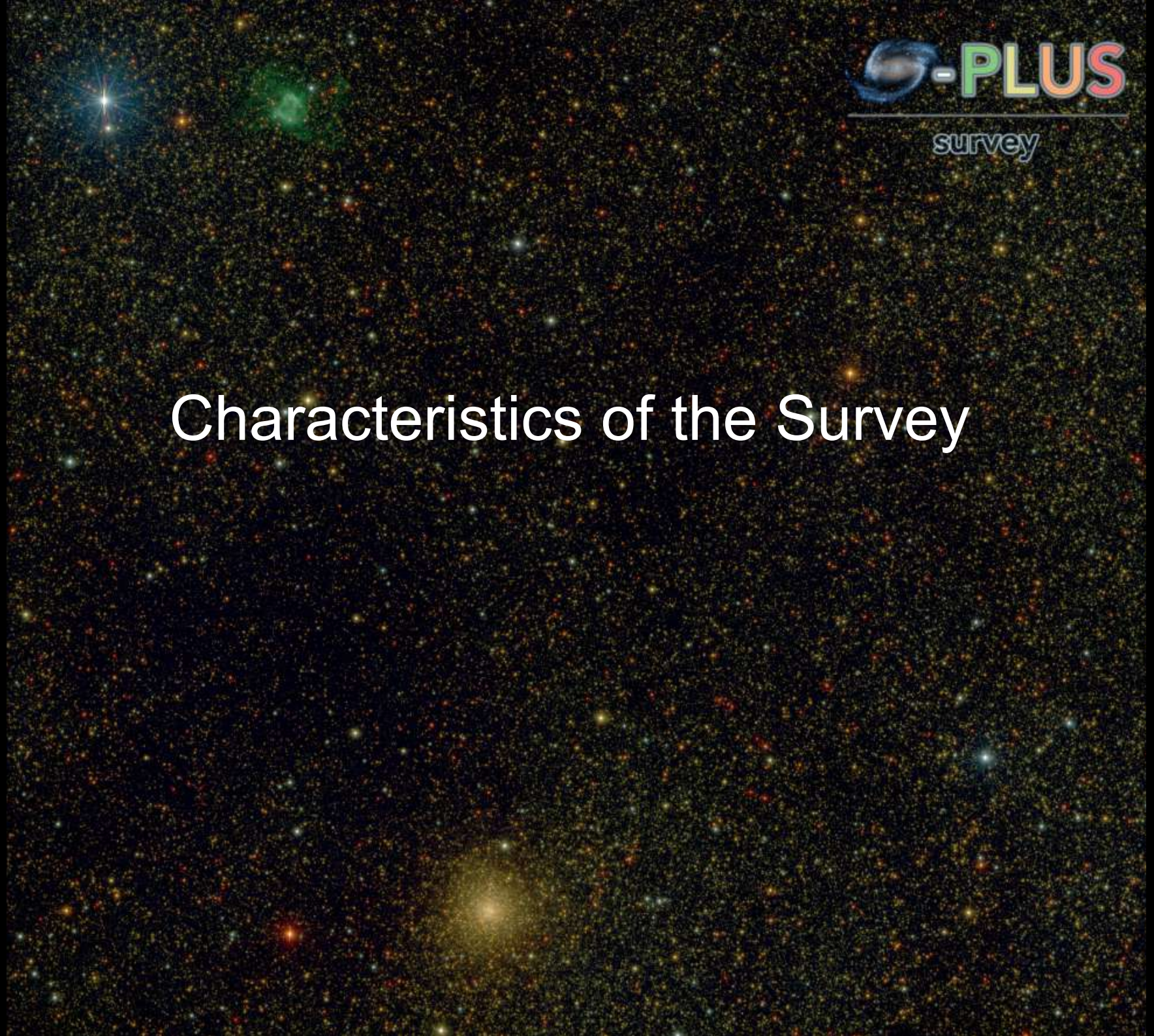
A low resolution spectrum is obtained by using 12 filters


12
[OII]
CaHK lines
Hδ
G-band
Hα
Calcium Triplet
6
4
Star (A0)
Mgb-Fe band
4000
5000
6000
7000
8000
9000
Wavelength [Å]

Field of view of T80-South images



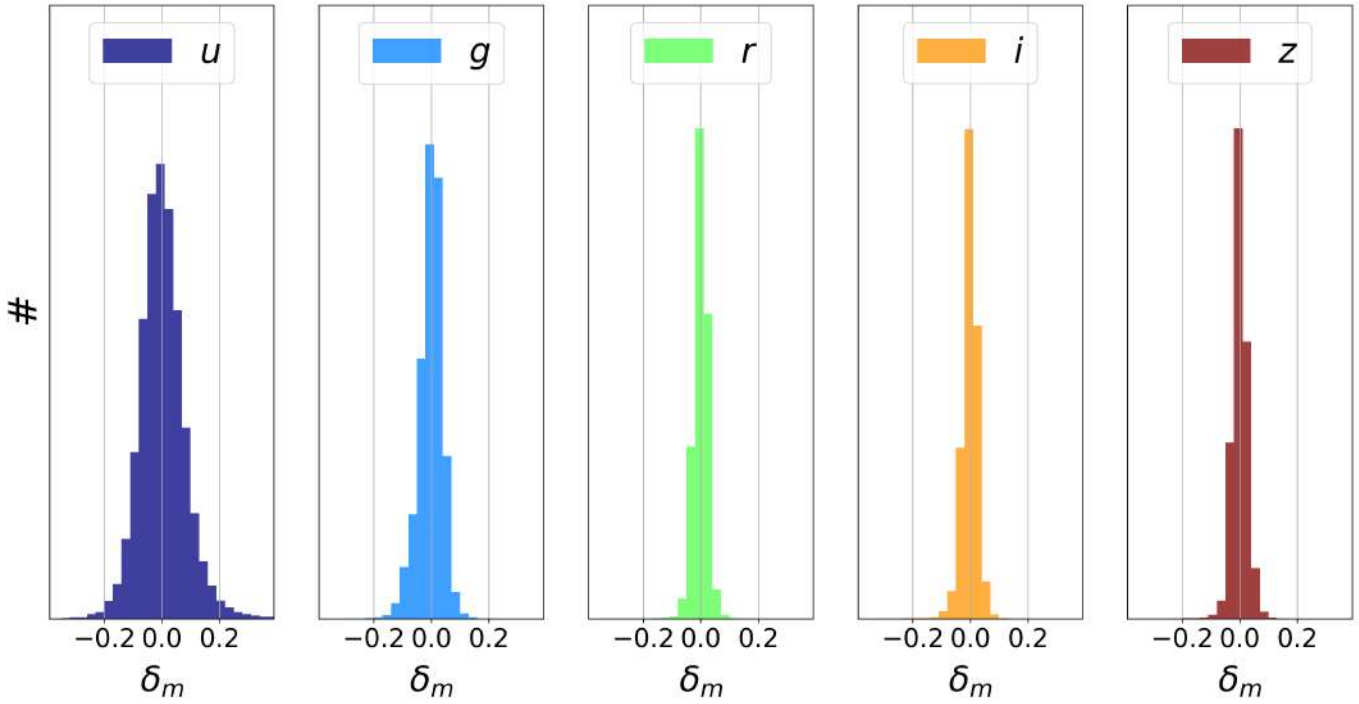

12”
PSF
0.55”/pix



Characteristics of the Survey

DR1 – www.noao.datalab

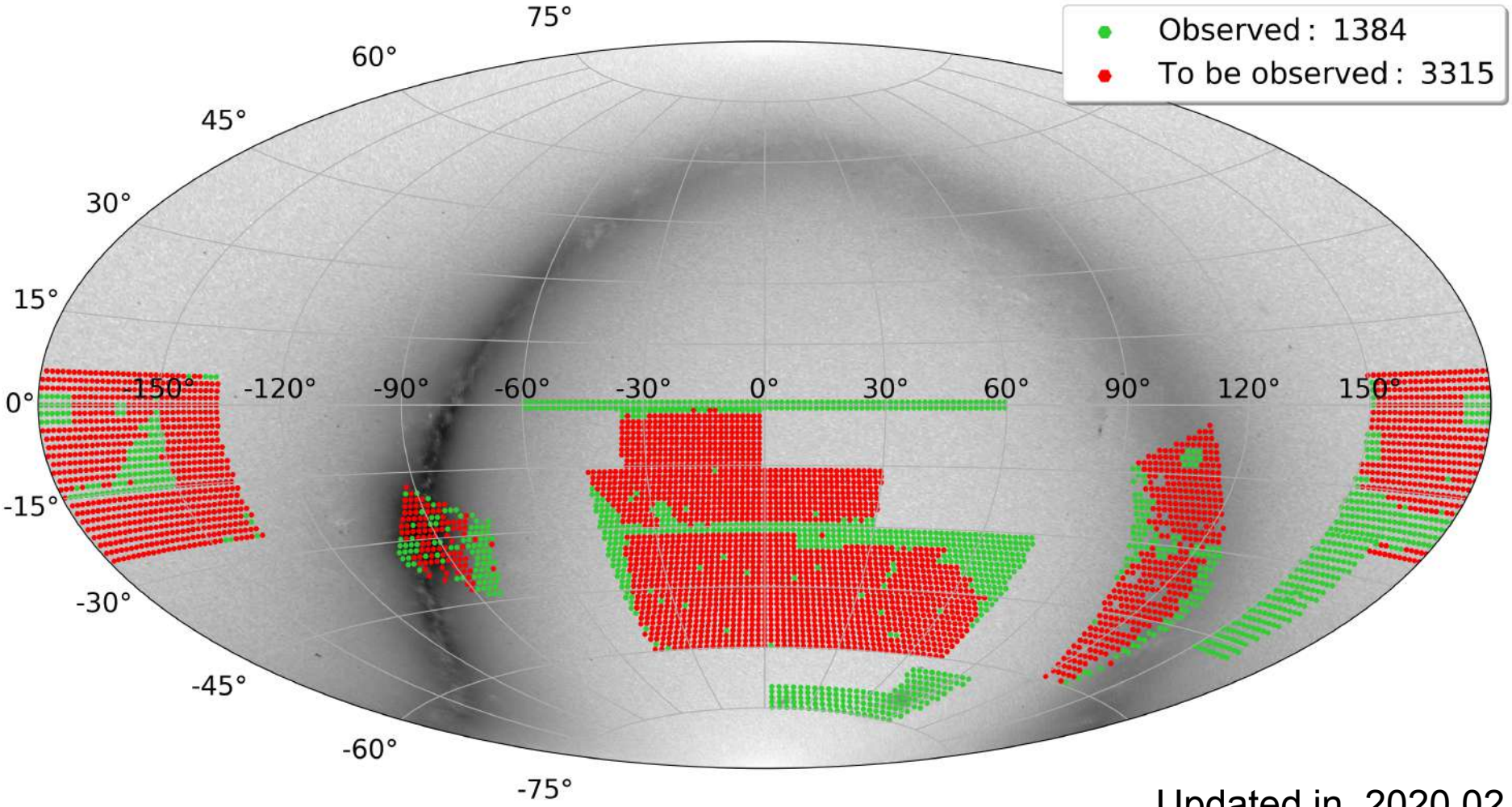
- Very first dataset taken with the telescope
- Accurate calibration – see below
- Area covered: 336 square degrees over Stripe82 (170 tiles)
- Bands: u, g, r, i, z, J0378, J0395, J0410, J0430, J0515, J0660, J0861
- # gal (r<21 in S-PLUS): 2M, 16M and 32M with photo-z precisions < 1%, 2% and 2.5%
- Astrometric accuracy = 0.1 arcsec
- Depth (S/N > 3, r band) = 21.4



u_rms = 0.06 g_rms = 0.04 r_rms = 0.02 i_rms = 0.02 z_rms = 0.02

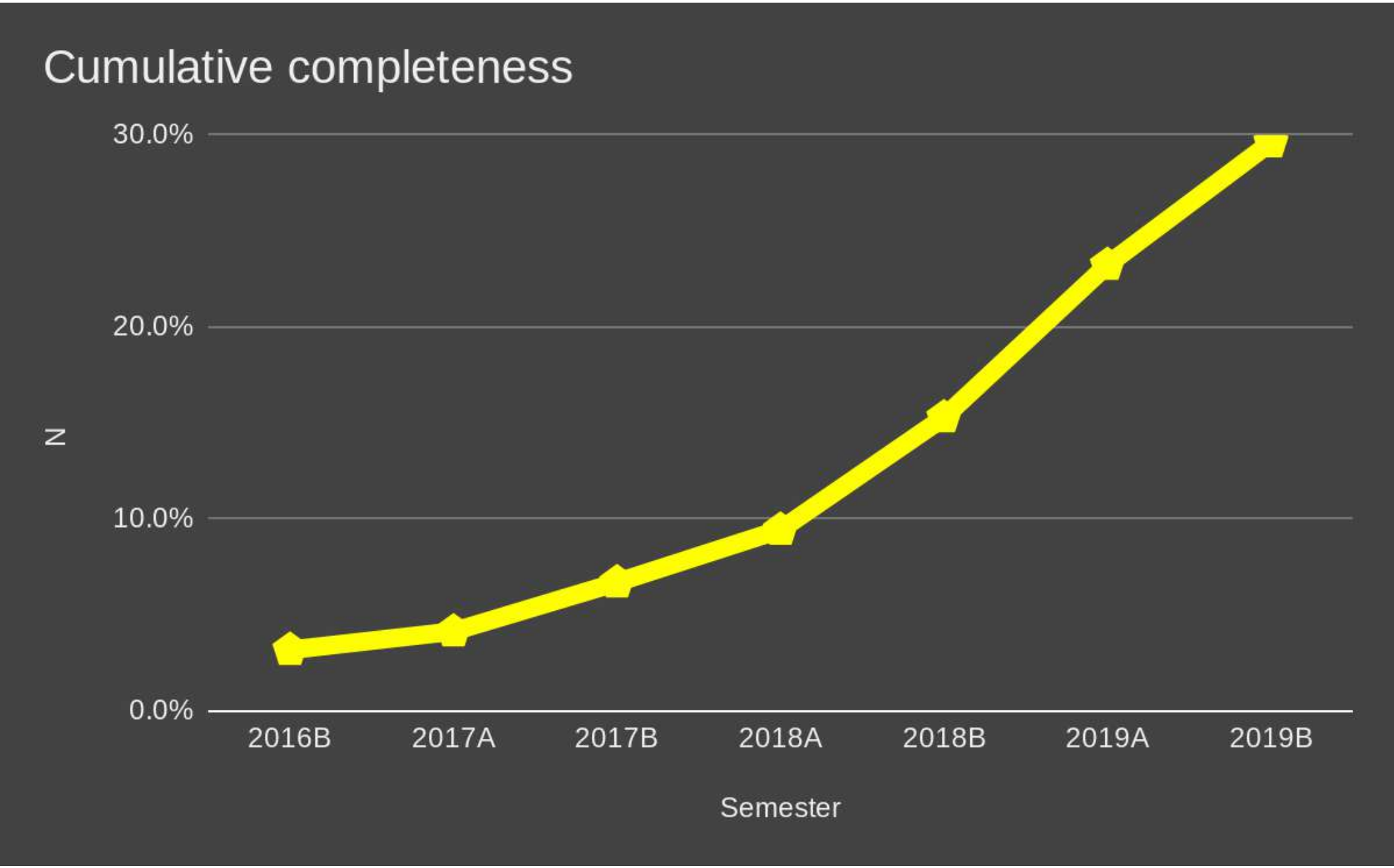
Comparison between S-PLUS and SDSS for Stripe-82 DR1 data for 3M stars in common

In red + green the survey footprint
In green what has been observed so far



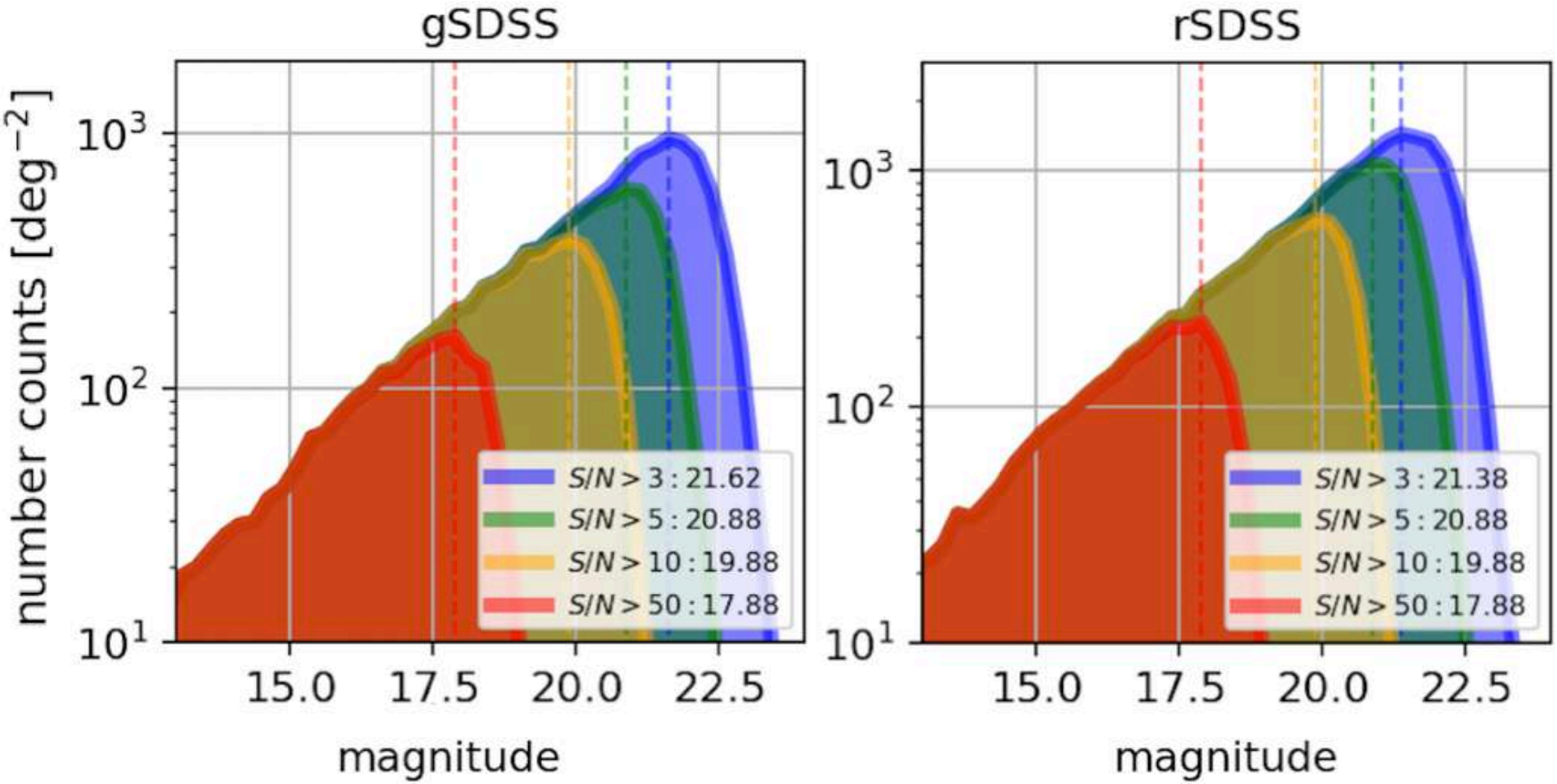
Updated in 2020.02.01

It should be possible to ask for prioritizing target observations that may lead to fast turn-around science



Updated in 2020.02.01

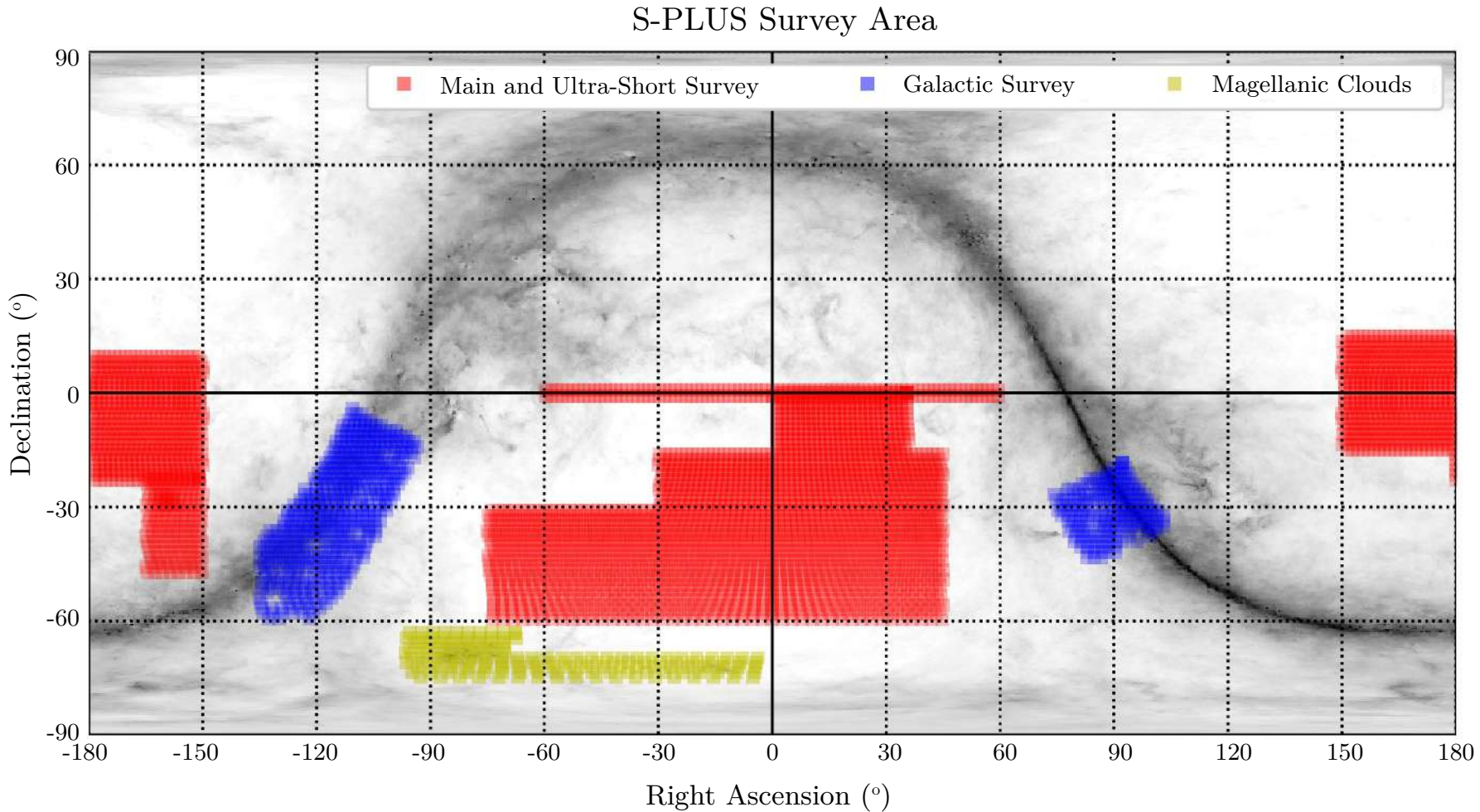
S-PLUS depths in g and r bands



About 0.5mag shallower than sloan

9300 deg² in 5 sub-surveys

- **MainSurvey**
- **Ultra-short survey**
- **Variability fields**
- **Galactic Survey**
- **Marble Fields**



9300 deg^2 in 5 sub-surveys

1. Main Survey (MS):

- It covers an area of ~8000 sq deg (b>30 deg), under photometric conditions and 0.9''<seeing<2.0'' down to magnitude r=21 AB (S/N=3) in 12 bands.
- For relatively nearby galaxies with recessional velocities v<4.000 km/s, the MS will provide maps of the [OII] and H-alpha emission-line fluxes, allowing a unique view of the Star-formation activity in the nearby Universe.
- It has significant overlapping areas with other photometric surveys in the Southern Hemisphere such as the Dark Energy Survey (DES), the Kilo Degree Survey (KiDS) or the ATLAS. This synergy will allow combining deep imaging with a large wavelength resolution provided by the 7 NB filters.

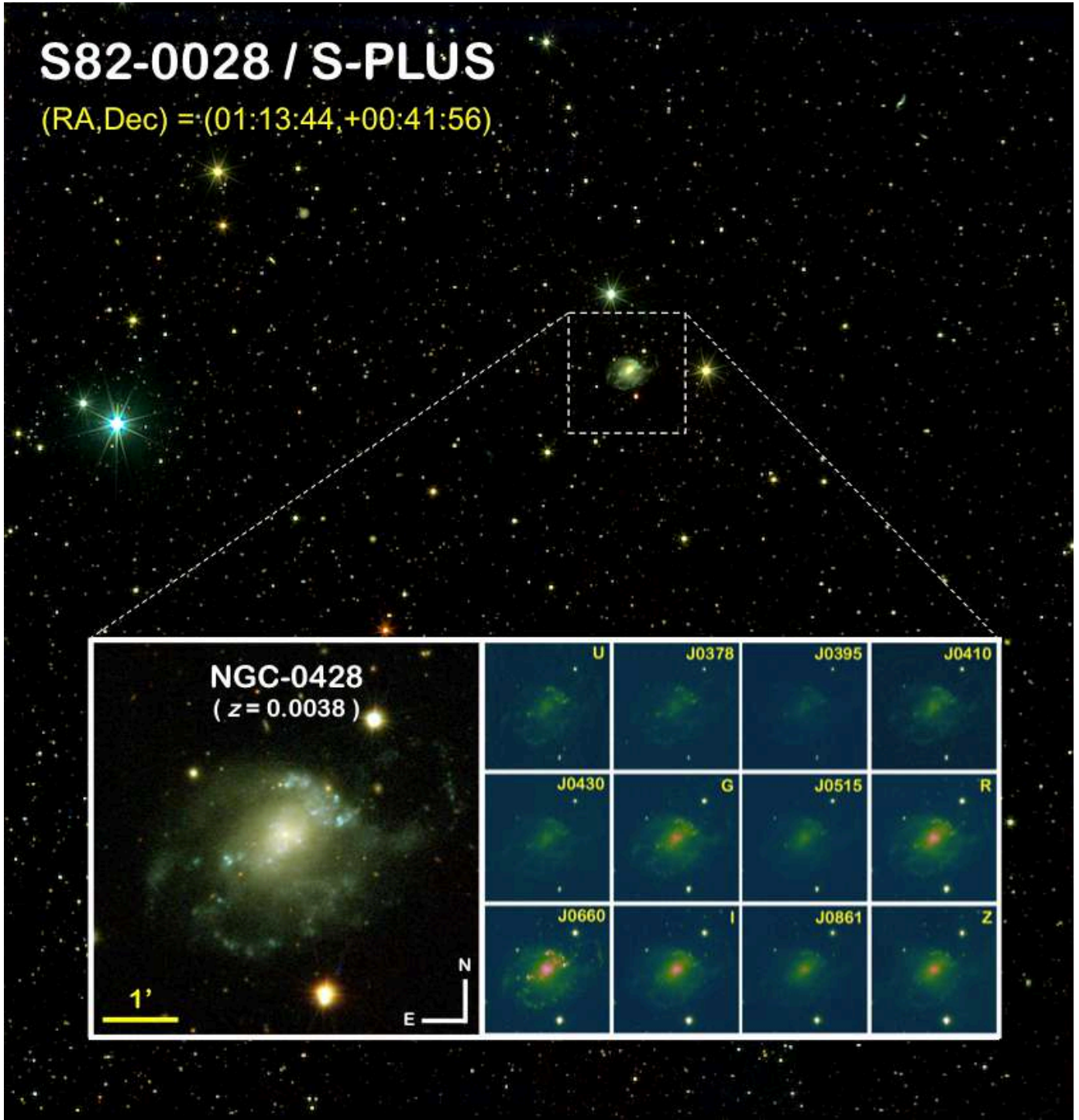
8000 deg^2

1. Main Survey (MS):

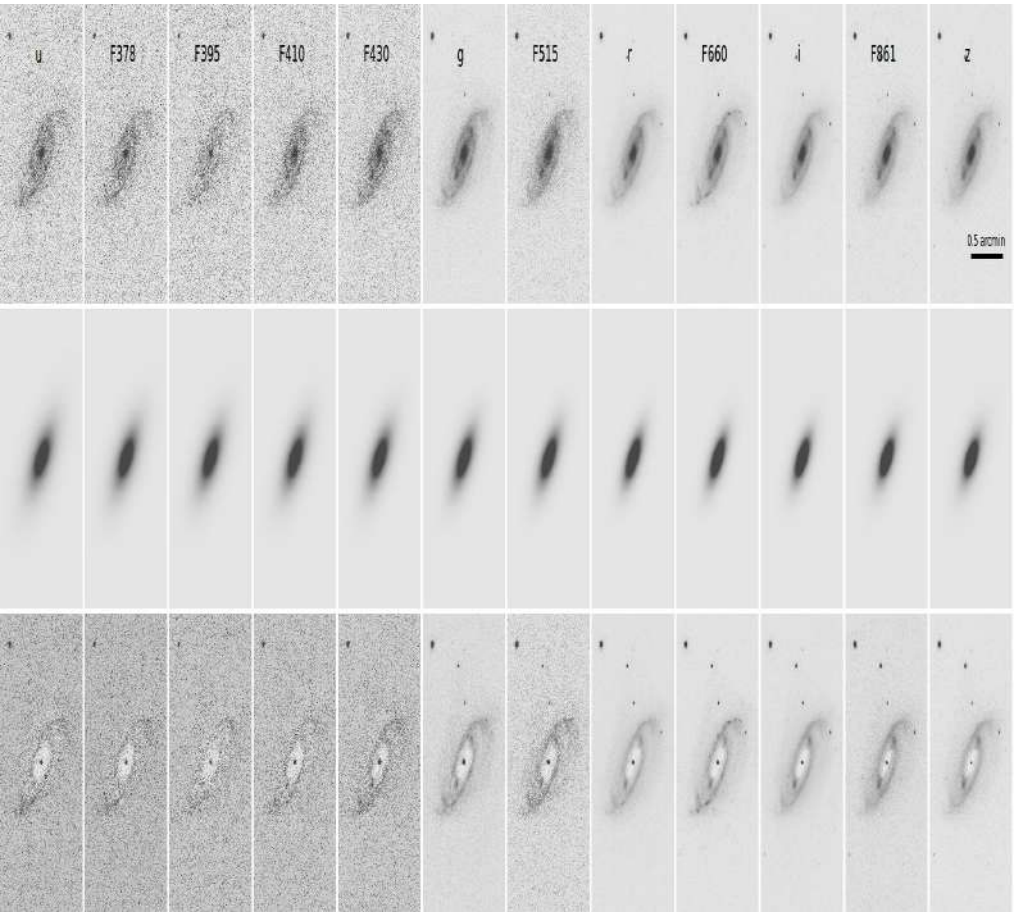
- Extragalactic:
  - Galaxy morphology and SFH versus environment.
  - IFU-like science
  - Detection of sub-structures, streams and dwarf galaxies in the Galactic Halo (<1200 deg^2 not yet observed).
  - Catalogues of interacting galaxies, pairs, small groups
  - Cosmology: LSS, BAO with LRGs, high-z QSOs & ELGs.

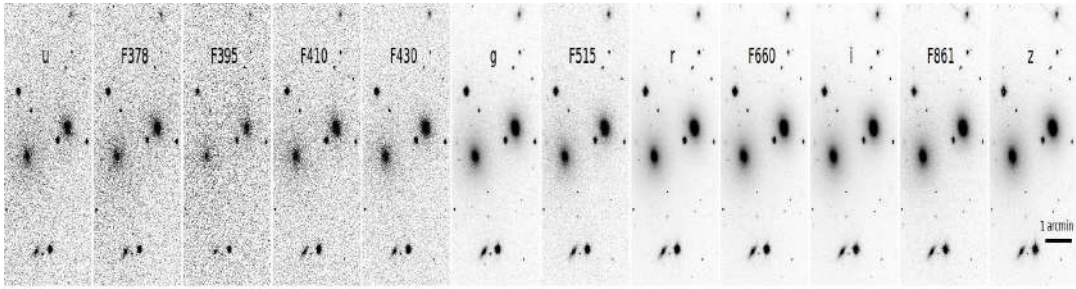
- Galactic:
  - blue horizontal branch (BHBs).
  - blue straggler star (BSS).
  - planetary nebulae (PNe).
  - symbiotic stars (SySts).

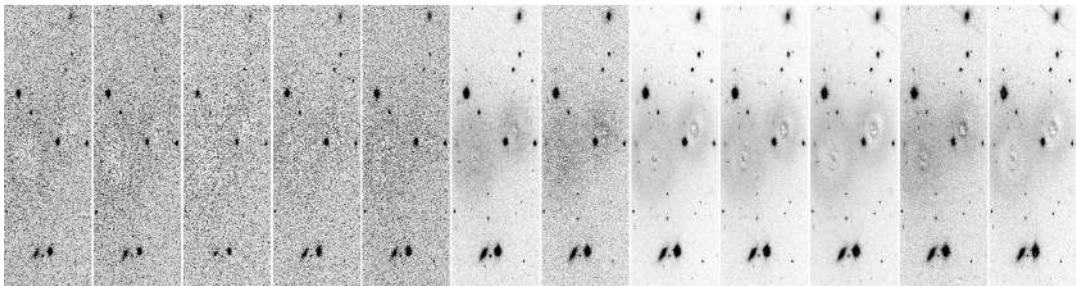
12 bands – morphology studies



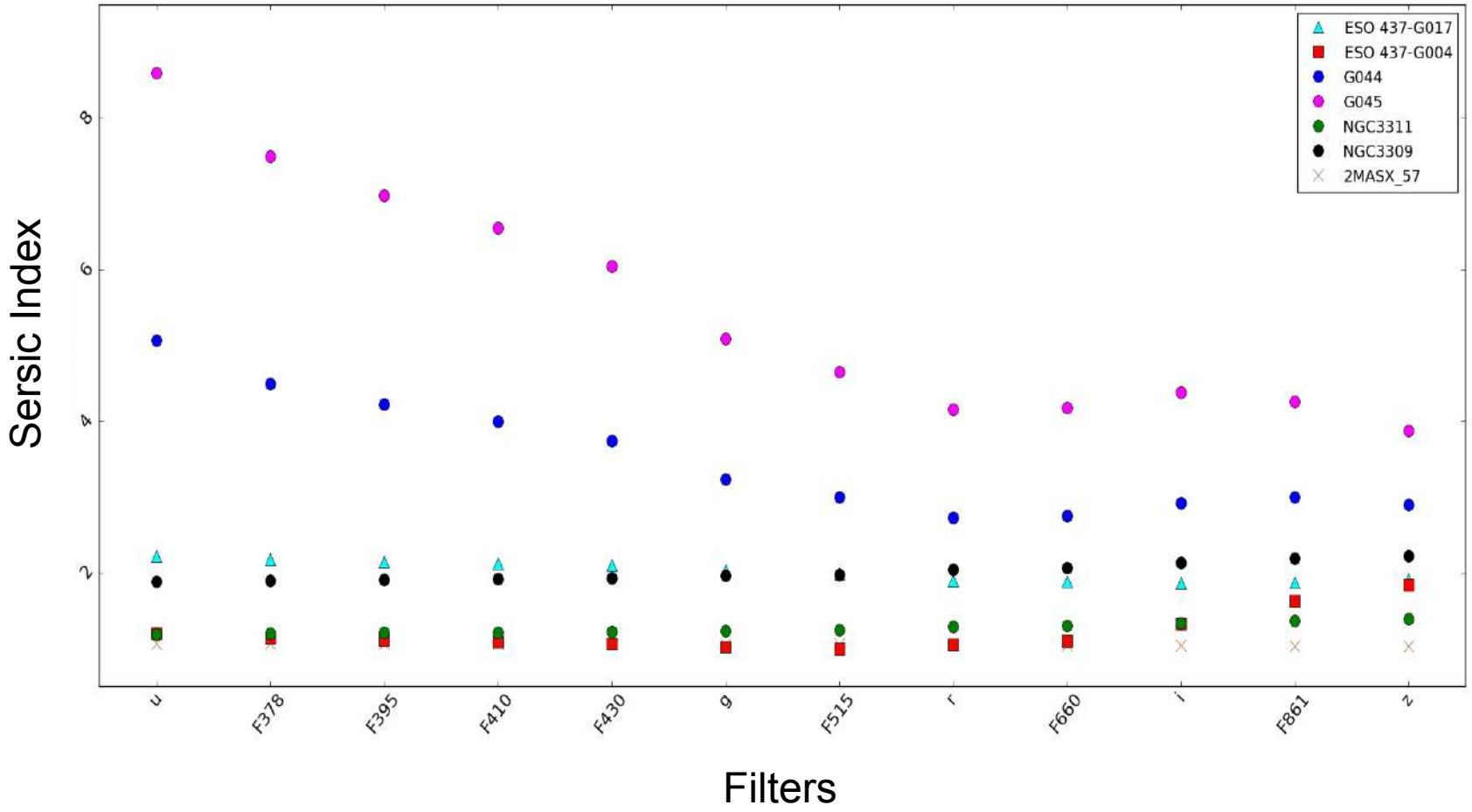
Massive fitting of morphological parameters using GALAPAGOS and MORPHOMETRIKA
Main goal: parameter fitting for different components using 12 bands





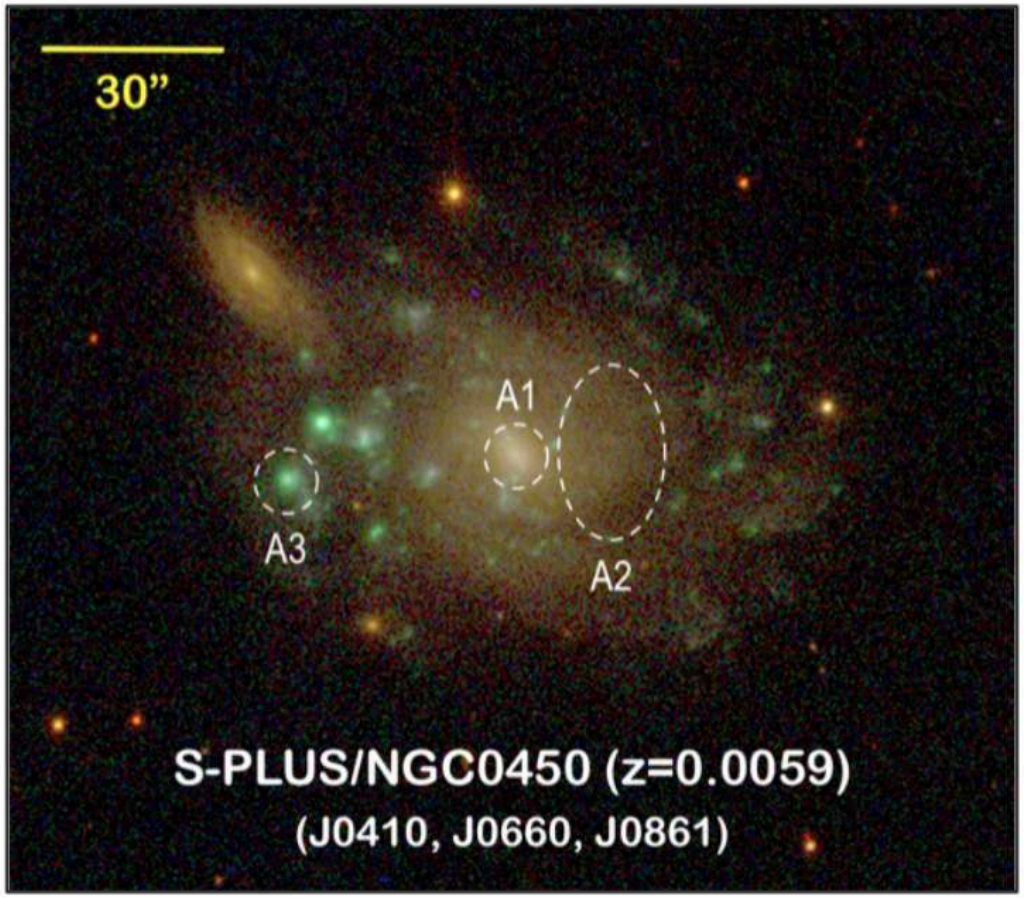


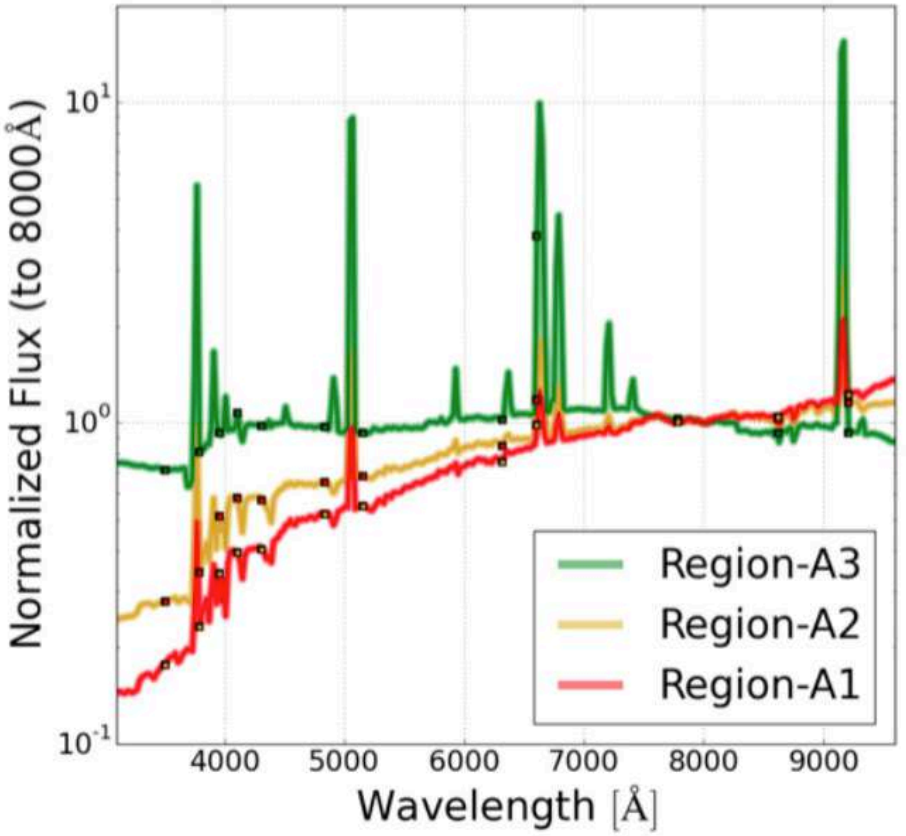
Sersic index variation in 12 filters for 8 galaxies in the Hydra cluster



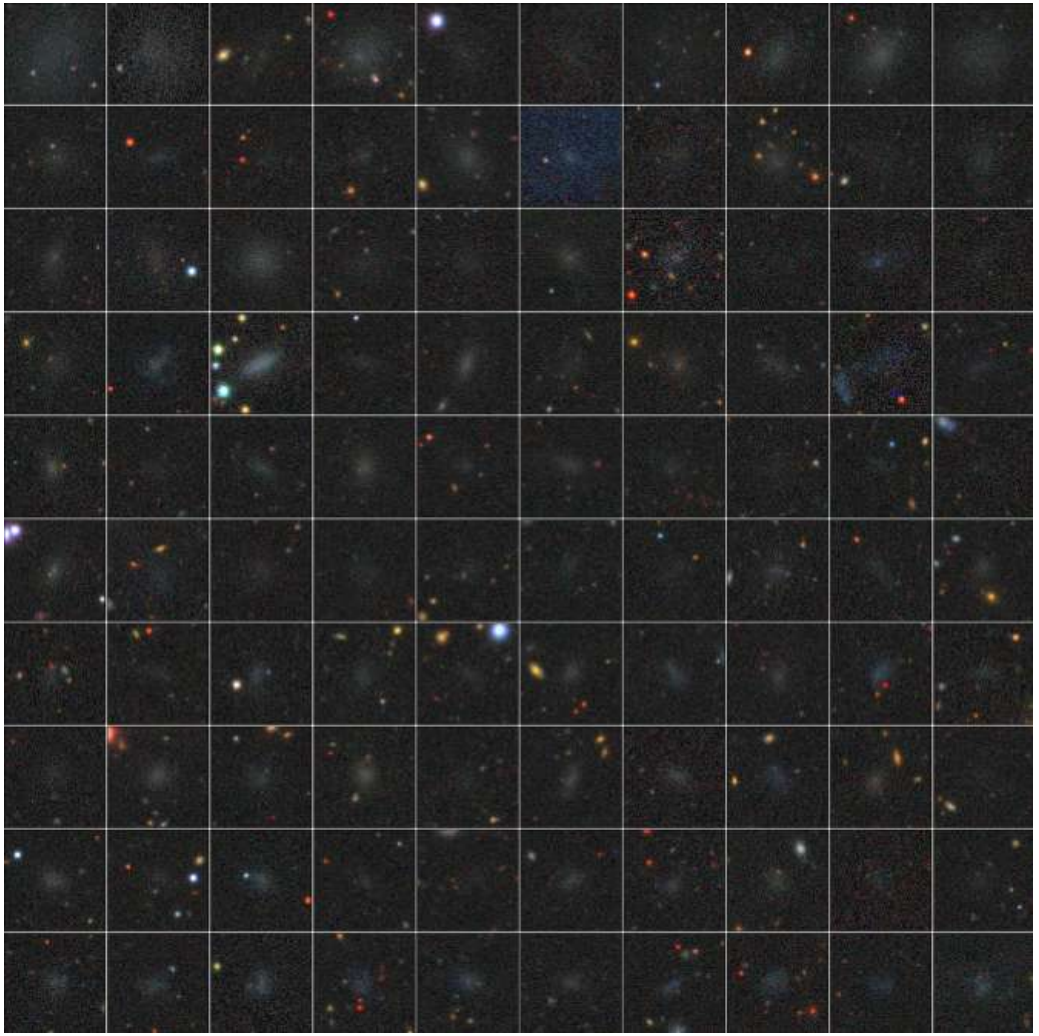
Morphometrika gives other important parameters such as spirality, asymmetry, etc… crucial for classification.

IFU-like science: SED analysis in different parts of the extended objects





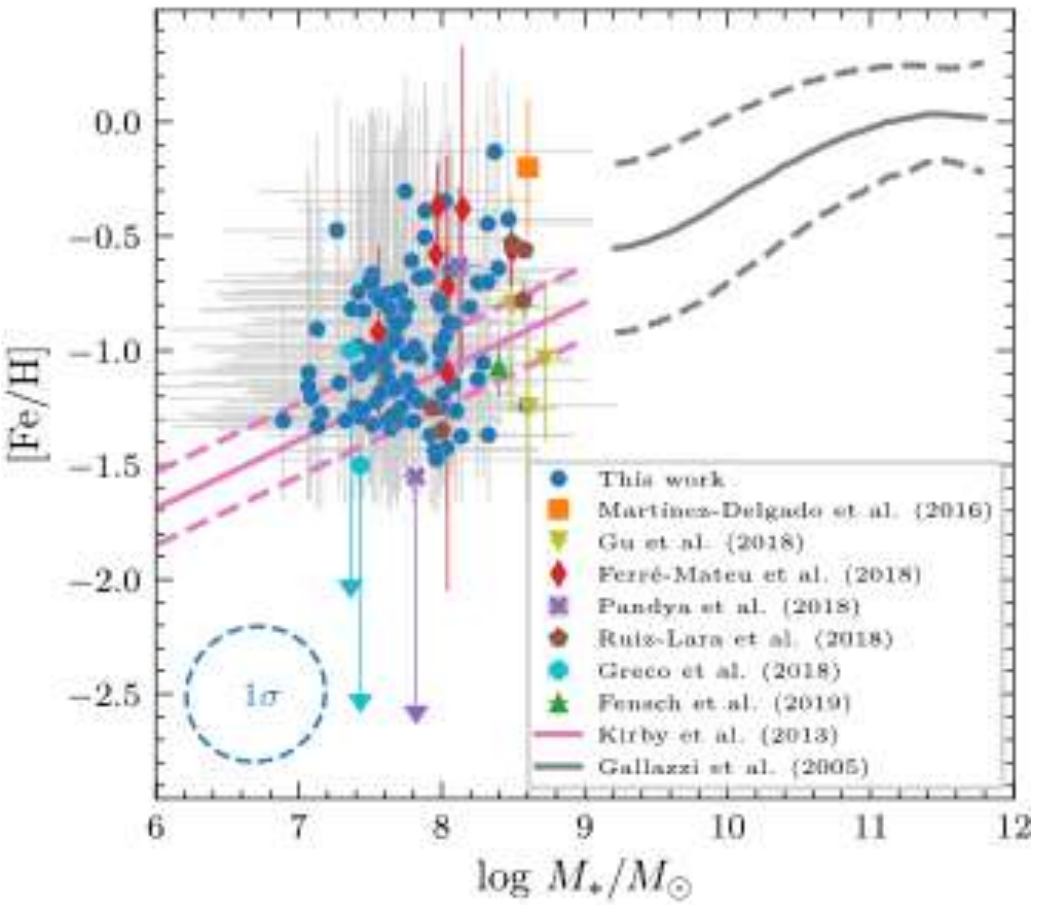
Studying ultra diffuse galaxies in the Stripe 82 area



100 SMUDGes in S-PLUS (Barbosa et al., in press)

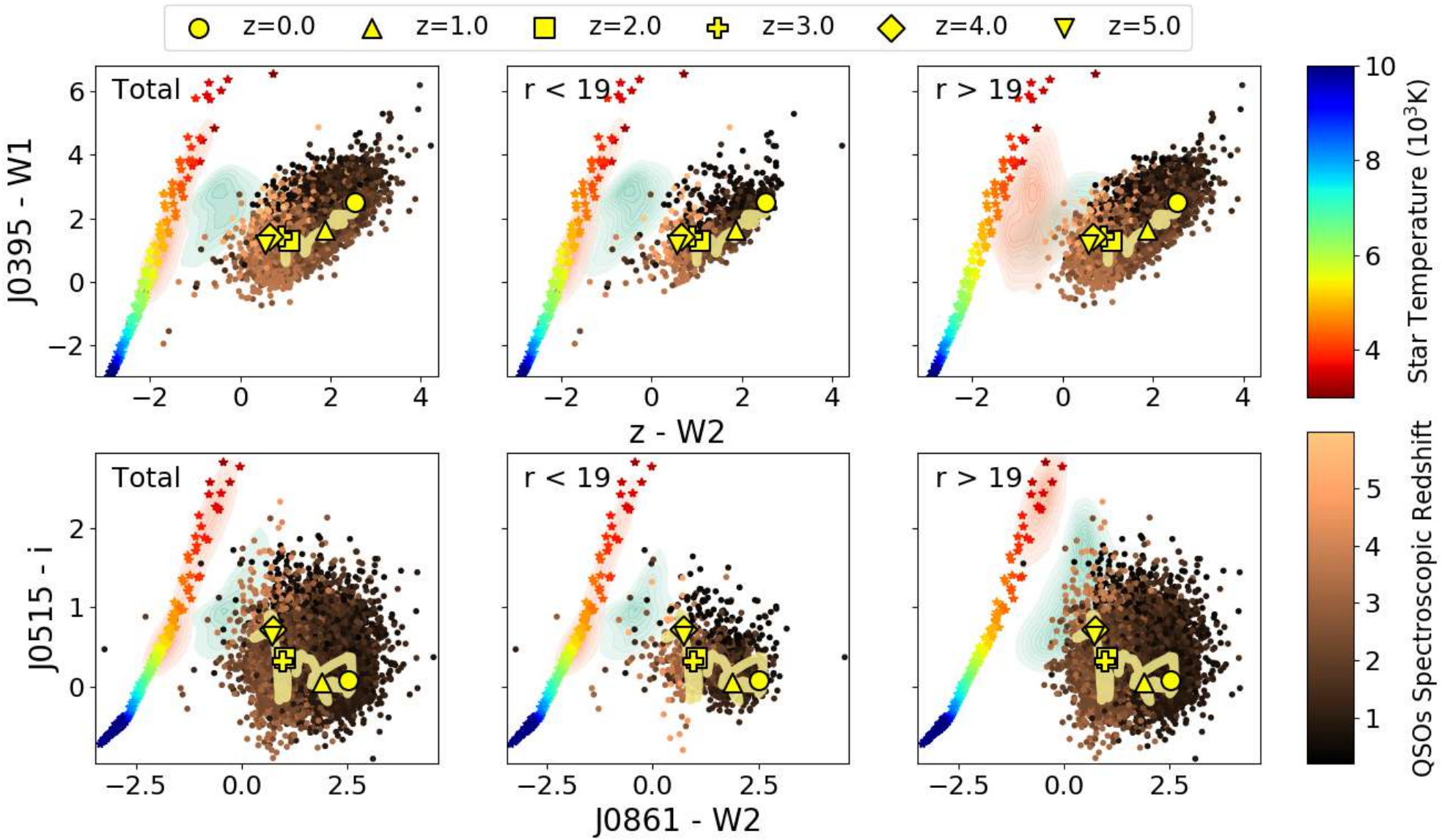
- Ultra diffuse galaxies (UDGs) are particularly large ($R_e > 1.5$ kpc) low surface galaxies ($\mu_g \gtrsim 24$) commonly found in clusters.
- Very few studies have found UDGs in the field, where they should be abundant.
- SMUDGes (Zaritsky et al., 2019) is performing a large area search for UDGs using DESI imaging archive.
- We used S-PLUS DR1 to study 100 ultra-diffuse galaxies found in the Stripe 82 area.

Studying ultra diffuse galaxies in the Stripe 82 area



- UDGs populate the same locus of the stellar mass-metallicity diagram of dwarf galaxies.
- Field UDGs have slightly smaller ages than those found in clusters, indicating that they may have more extended star formation histories in the field.
- UDGs should arise naturally considering a broad range of galaxies within the current picture of galaxy formation rather than exotic processes.

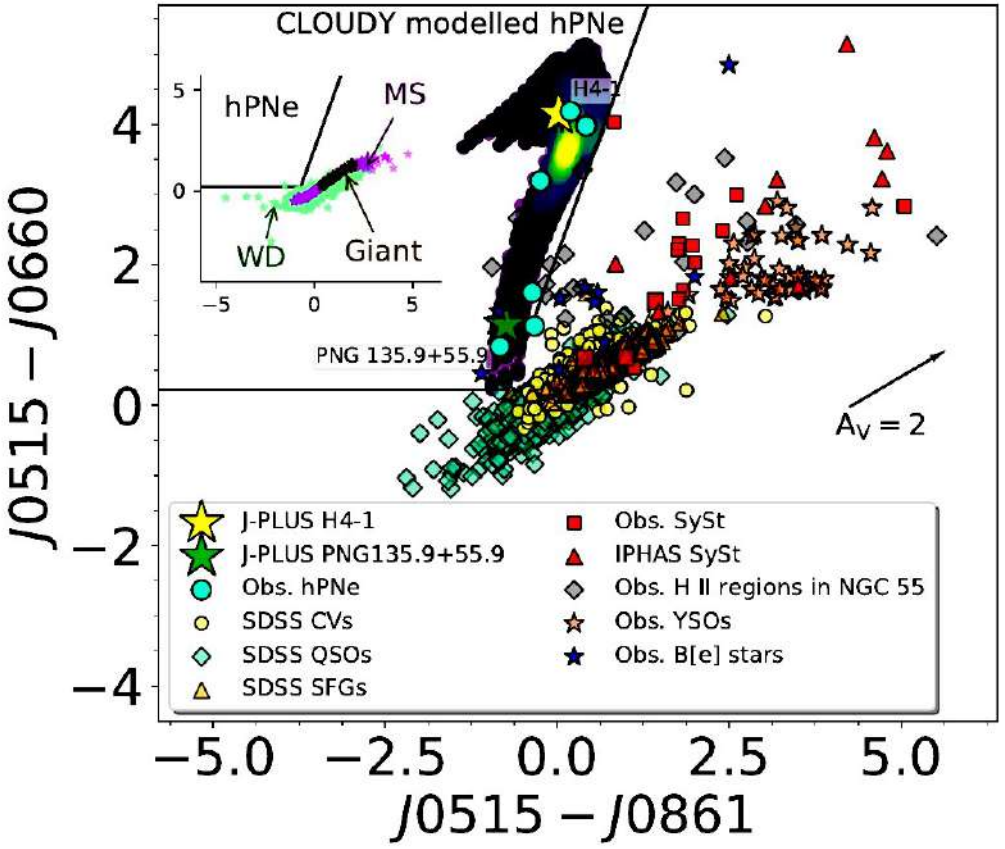
Finding quasars and star-galaxy-quasar separation



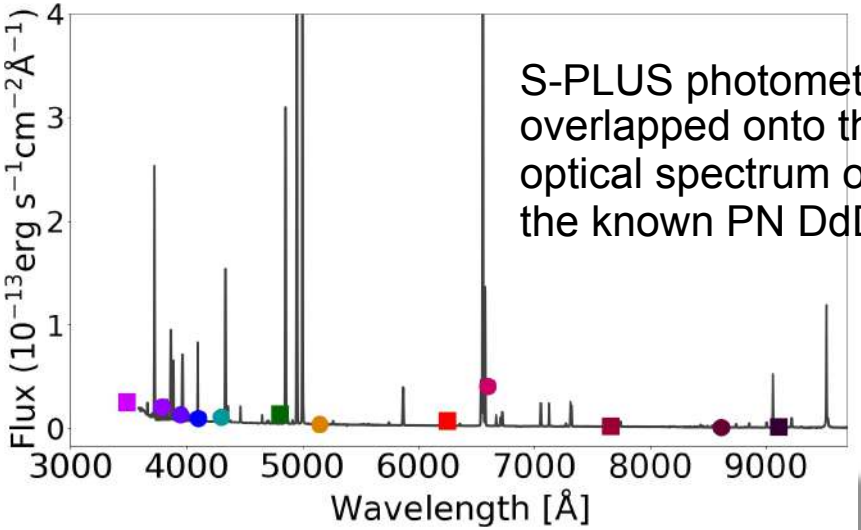
S-PLUS: SEARCHING FOR PNe

One example of S-PLUS colour-colour diagram

[Gutiérrez-Soto et al. 2020]



(J0515 – Hα+[N II]) vs (r - i)

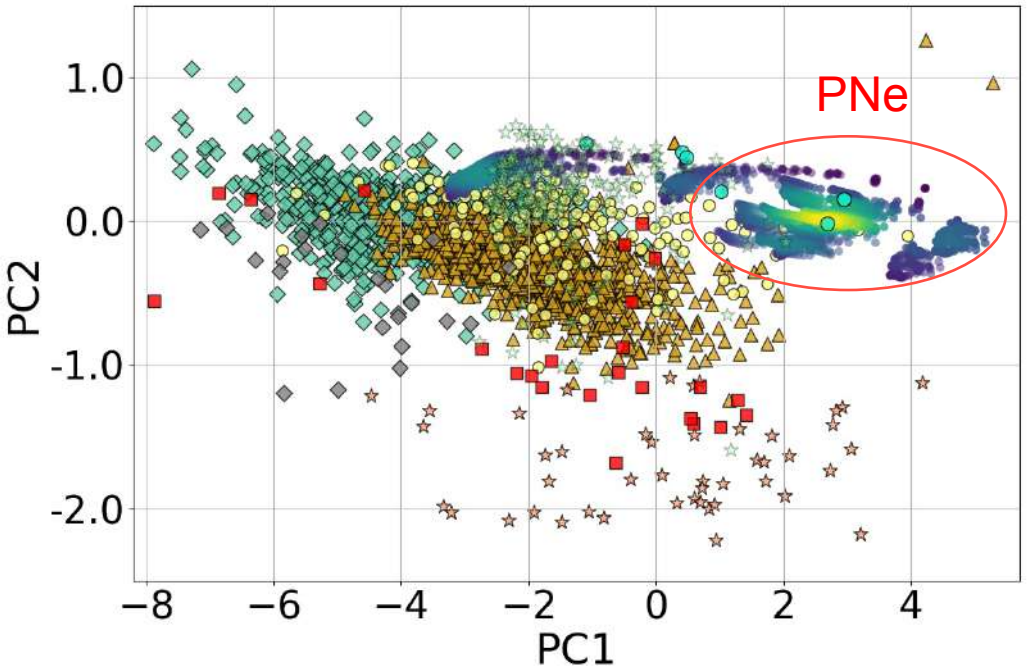


S-PLUS photometry overlapped onto the optical spectrum of the known PN DdDm1

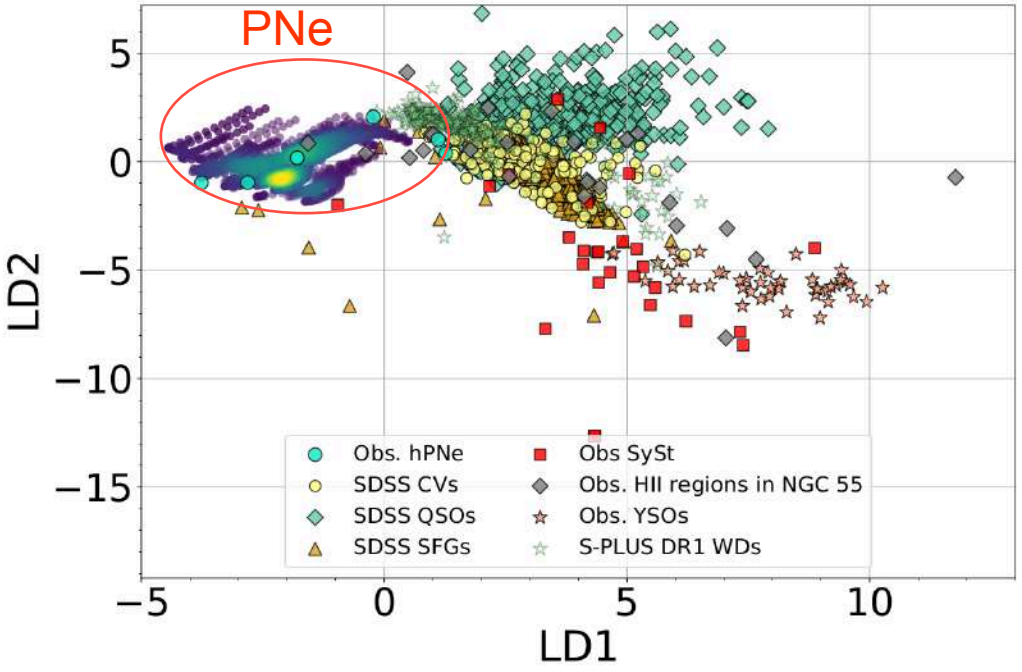
The black lines represent the selection criteria for PNe. These lines are meant to isolate these types of strong line emitters and minimize the contamination from other emission line objects.

SEARCHING FOR PNe

Principal component analysis (PCA)

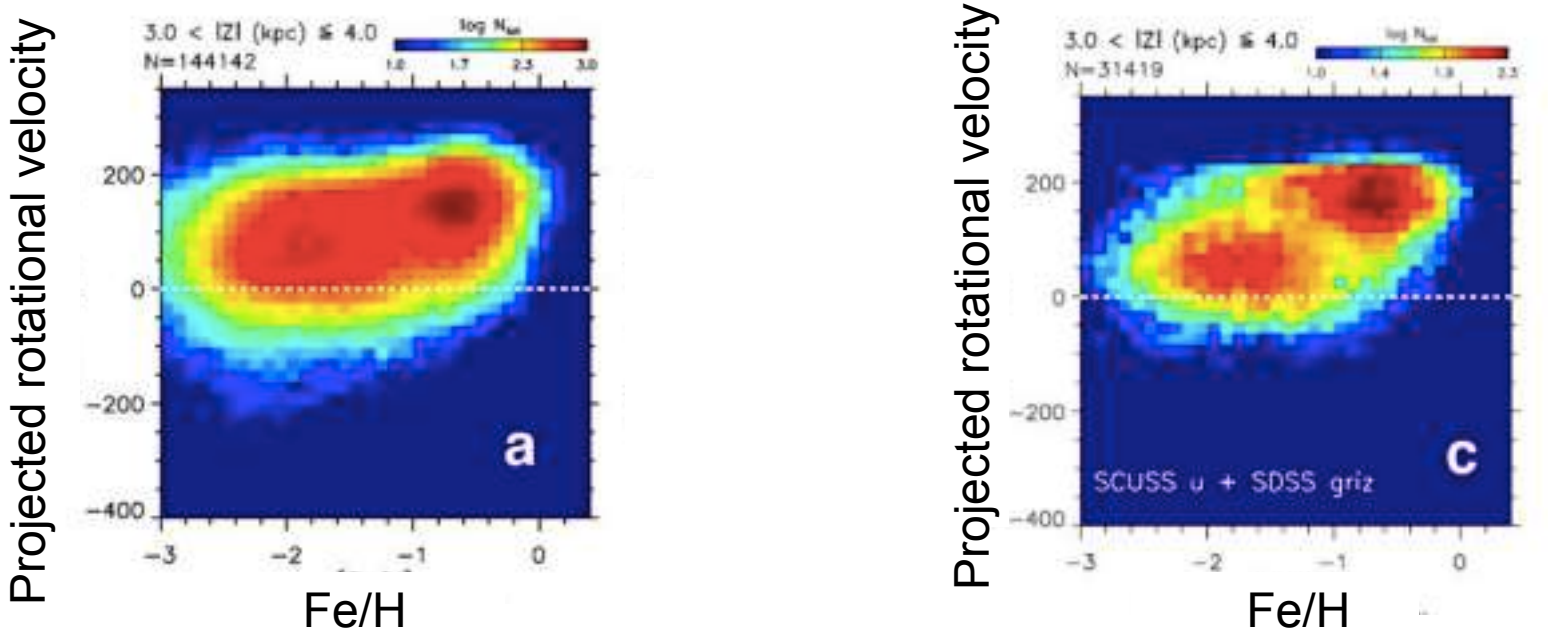


Linear discriminant analysis (LDA)



PCA (left) and LDA (right) applied to the 12 filters of S-PLUS. PNe are grouping in specific regions in the PC1-PC2 and LD1-LD2 planes.

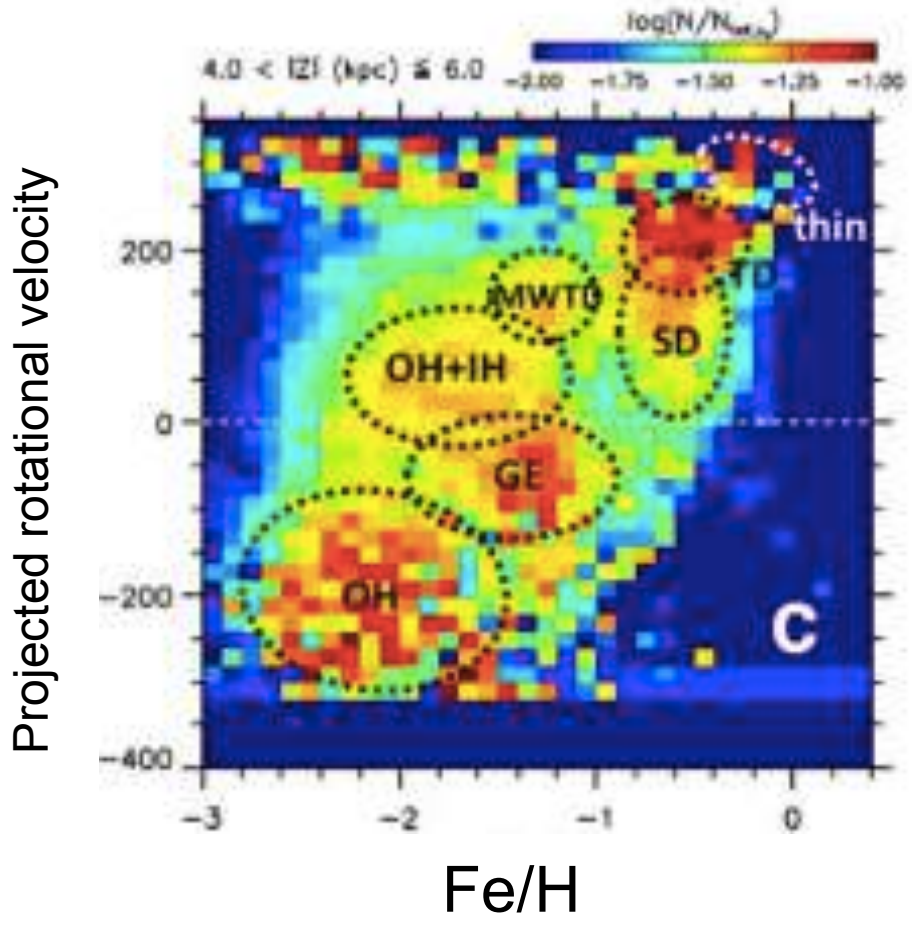
Mapping stellar components of the Milky Way



Combining Gaia data with metallicity determinations obtained from broad-band photometry

Distribution of stars at a certain height (3.5 kpc) above the Galaxy plane, using 5 sdss bands
In (a) and in (c) the metallicity determinations were improved by using 3-mag deeper u-band,
Reaching photometric metallicities as precise as 0.3 dex for bright stars
(S-PLUS will do better)

Structures of the Milky Way as revealed by the Fe/H against rotational velocity diagram



OH = Outer halo

GE = Gaia-Enceladus

IH = Inner Halo

MWTD = the metal weak thick disk

SD = the Splashed Disk

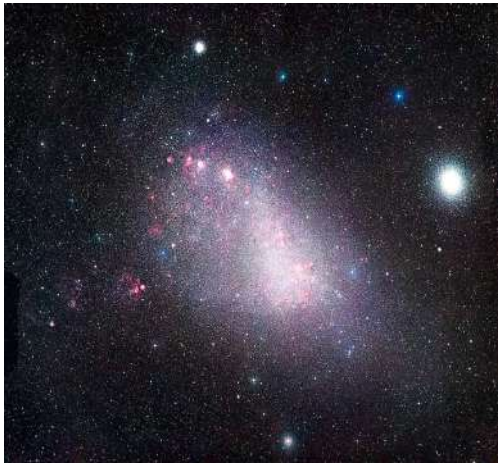
The various stellar components are clearly separated from each other in the metallicity versus rotation velocity space

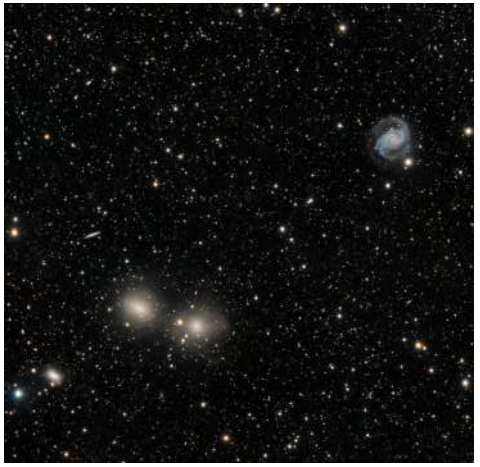
9300 deg^2 in 5 sub-surveys

2. Marble Fields (MFS):

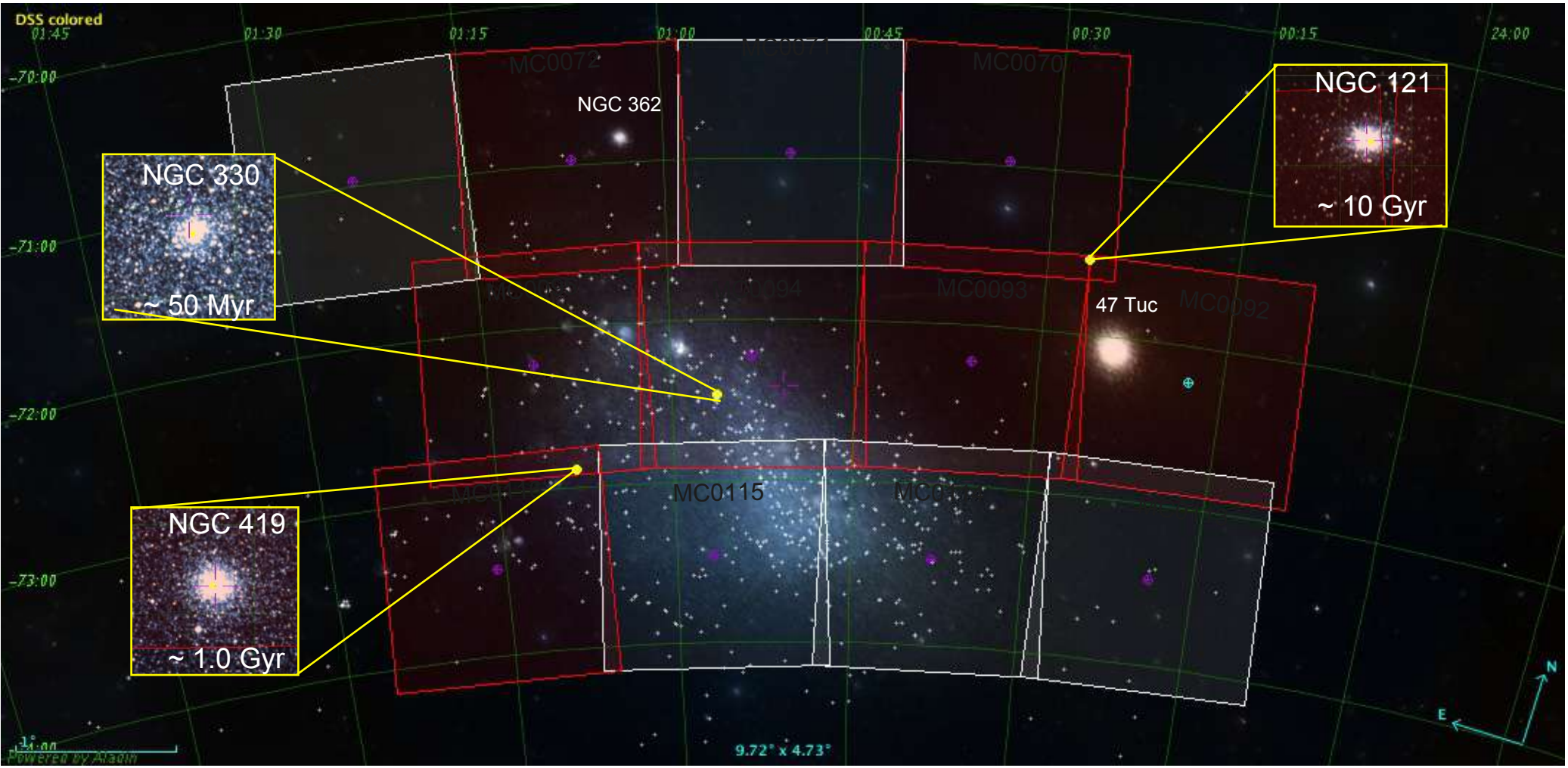
- It is composed by a set of fields that will be revisited as often as possible always under photometric weather conditions, and the seeing > 2.0” (for intragroup light, galaxy stellar and gaseous halos Halpha and OII maps, etc).

- The target selection includes: the Small Magellanic Cloud, M83 (only NBs) and centers of the Dorado group and Hydra cluster





SMC Marble field



Stellar Clusters (Bica et al. 2008)

9300 deg^2 in 5 sub-surveys

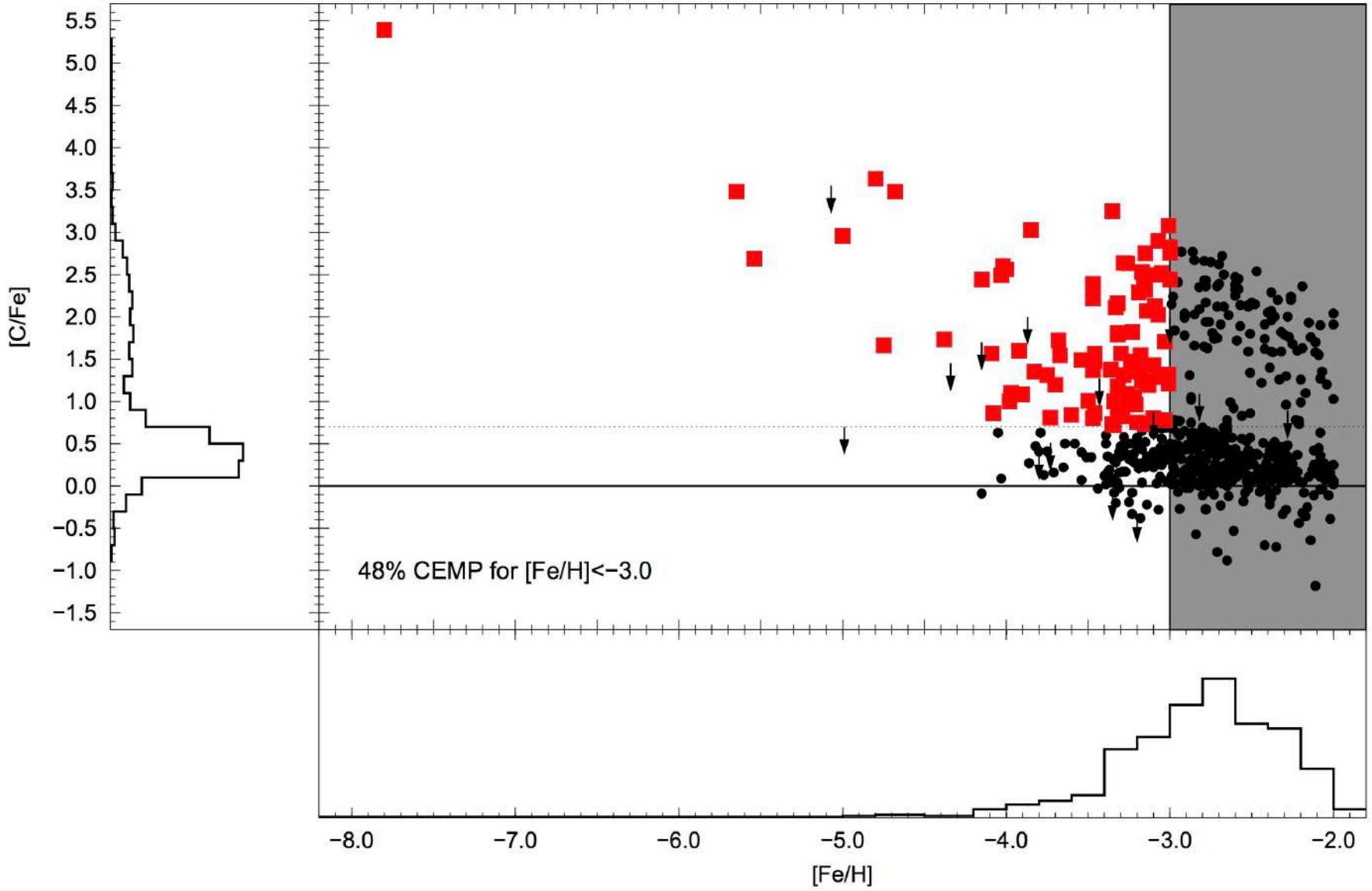
3. Ultra-short survey (USS):

- It covers the full area of 9300 deg^2, under any conditions and specially in bright moon. It covers the 12 bands.
- Motivated by the search for the lowest-metallicity and carbon-enhanced stars in the Galaxy, since they carry important information regarding the formation and early evolution of the Chemistry in the Early Universe as well as the assembly of the Milky Way.
- The combination of short exposure-times (1/12 of the MS exposure times) and the information provided by the 7 NBs and 5BBs allow measurements of bright stars not acessible by other surveys, providing catalogs for a subsequent high-resolution spectroscopic follow-up (HST or Stelles on SOAR).

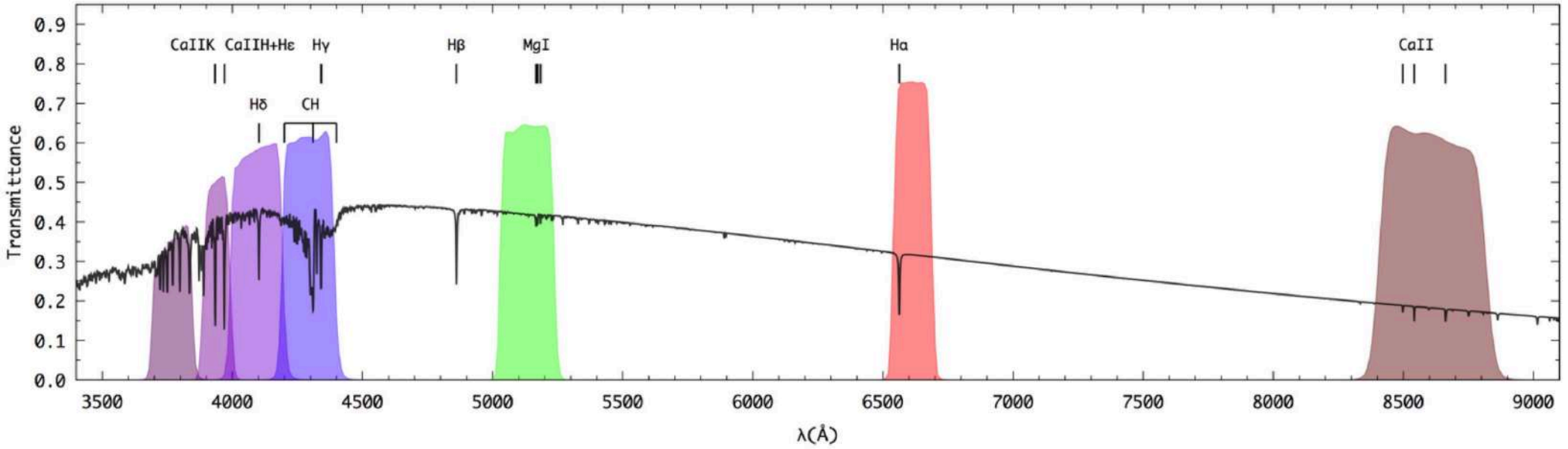
Why do the ultra-fast survey?

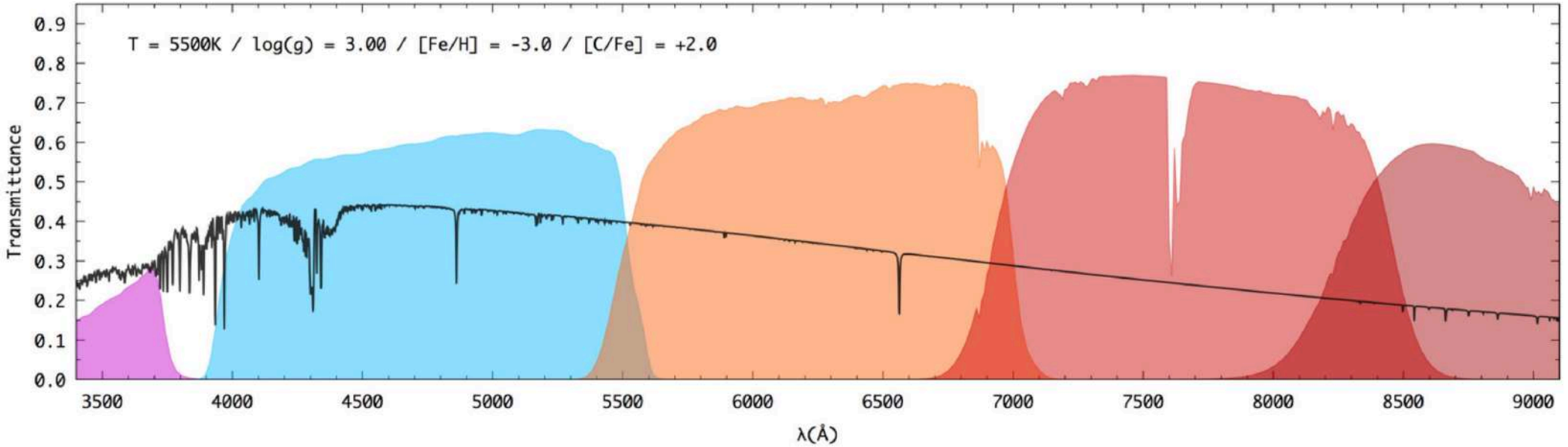
[Fe/H] x [C/Fe]

Most low-metallicity stars are carbon enhanced



Searching for metal-poor stars
(narrow-band vs. broad-band)

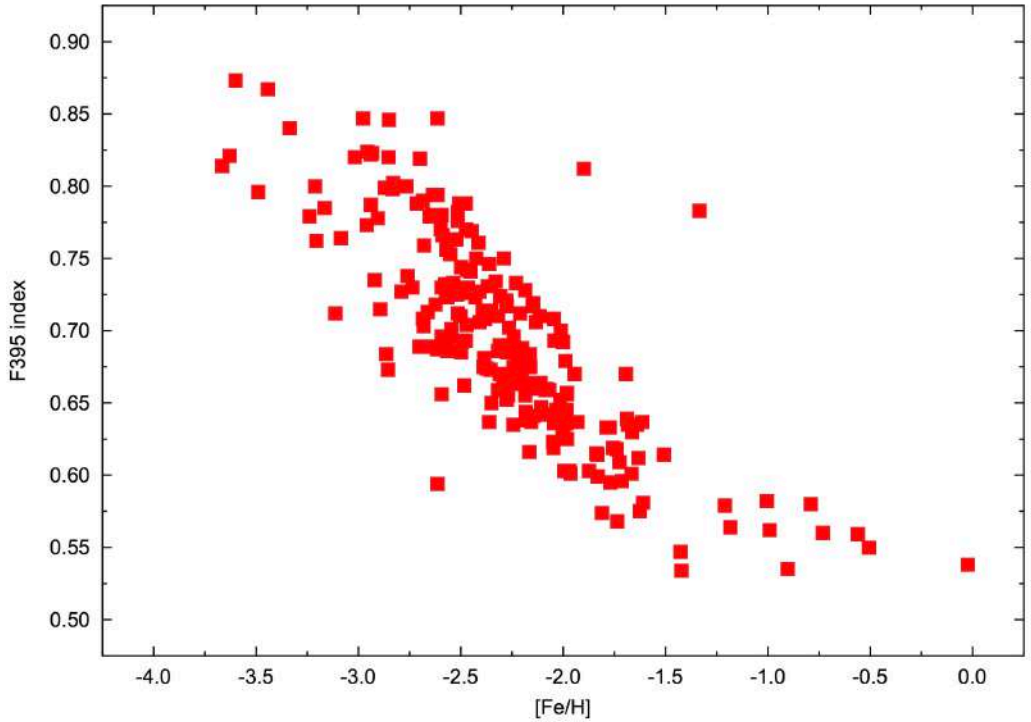




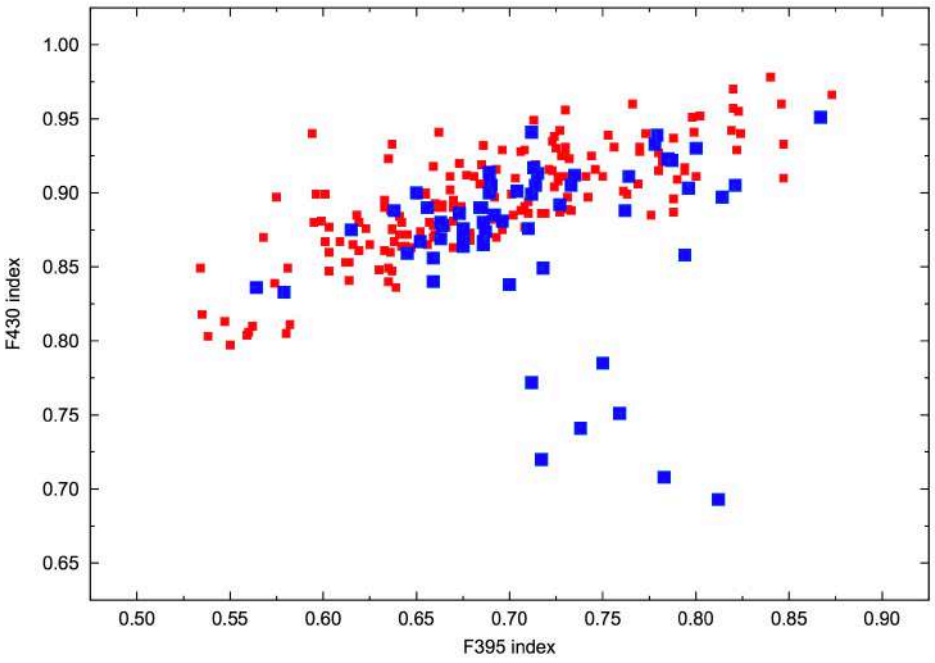
Tested S-PLUS potential using sample with known [Fe/H] and [C/Fe]

Test database

- RAVE follow-up spectra with GEMINI/ESO/KPNO/SOAR
- 1161 stars
- $-4.0 < [Fe/H] < 0.0$
- $4000 < T_{eff} < 8000$
- F348 / F378 / F395 / F410 / F430 / F515

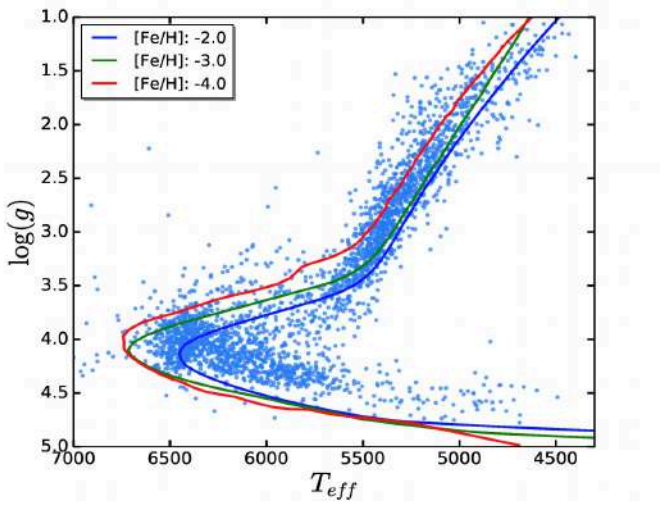


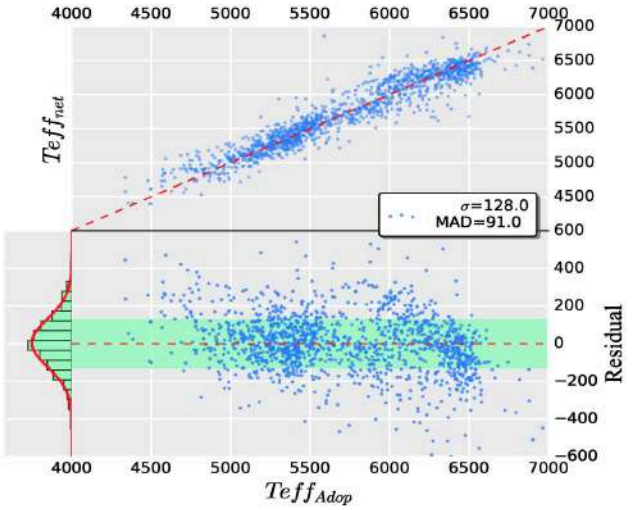
Metallicity dependence (F395)

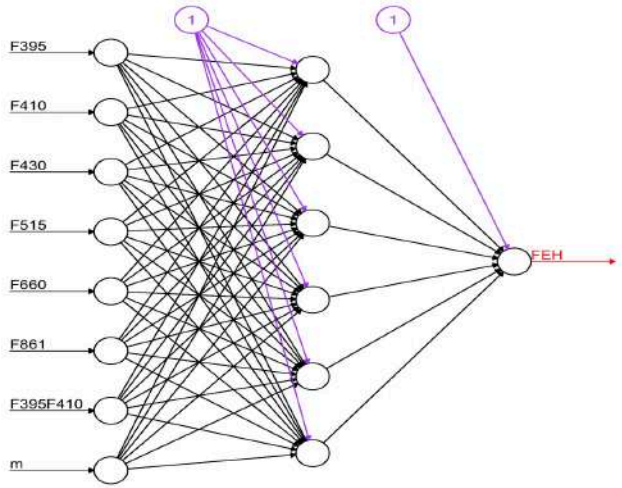


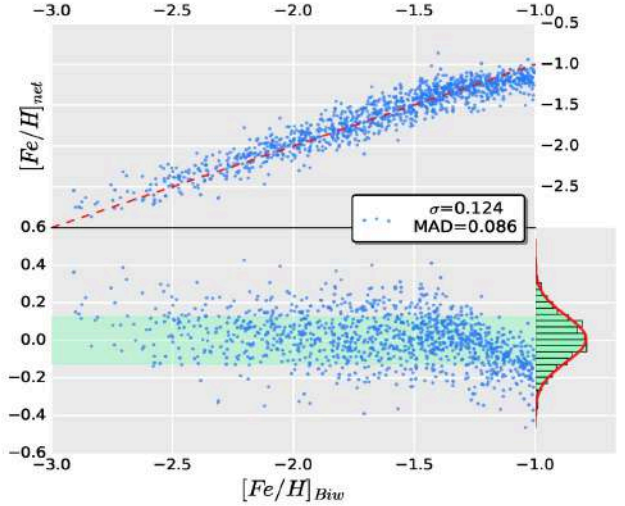
Carbon dependence (F430)
Blue points

Predicting Teff and [Fe/H] using Artificial Neural Networks (Whitten et al. 2019 using J-PLUS)









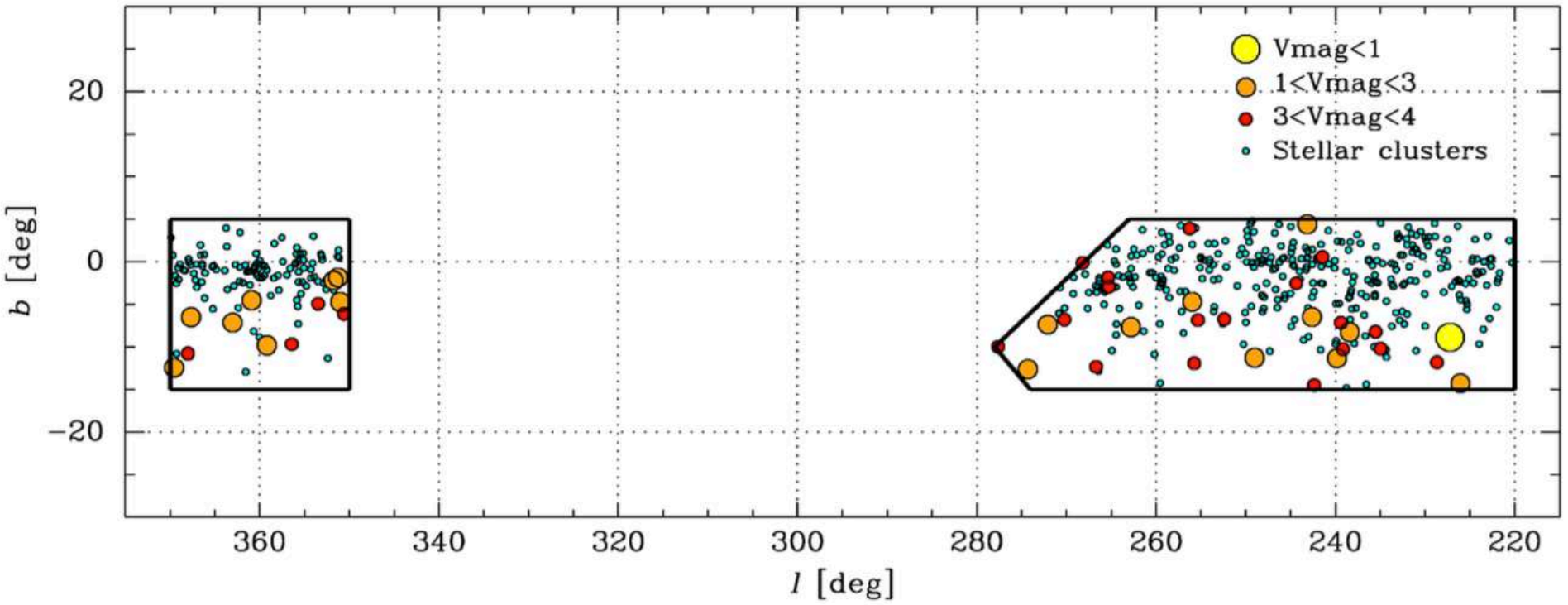
Goal: estimate stellar parameters from narrow- and broad-band photometry using ANN. To properly train the ANN, the SDSS/SEGUE database of ~200K stars is used. The ANN will then map the photometric inputs (magnitudes and colors) into stellar parameters (Teff, logg, and [Fe/H]) and carbon abundances ([C/Fe]). Note the small scatter in the predictions for temperature (~100K) and metallicity (~0.1dex).

9300 deg^2 in 5 sub-surveys

4. Galactic Survey (GS):

- It covers an area of about 1300 deg^2 in the Milky Way plane in all the 12 filters, covering two regions down to MS depth:

  - in the bulge (350º<l<10º and -15º<b<+5º)
  - in the disk (220º<l<278º and -15º<b<+5º)



9300 deg^2 in 5 sub-surveys

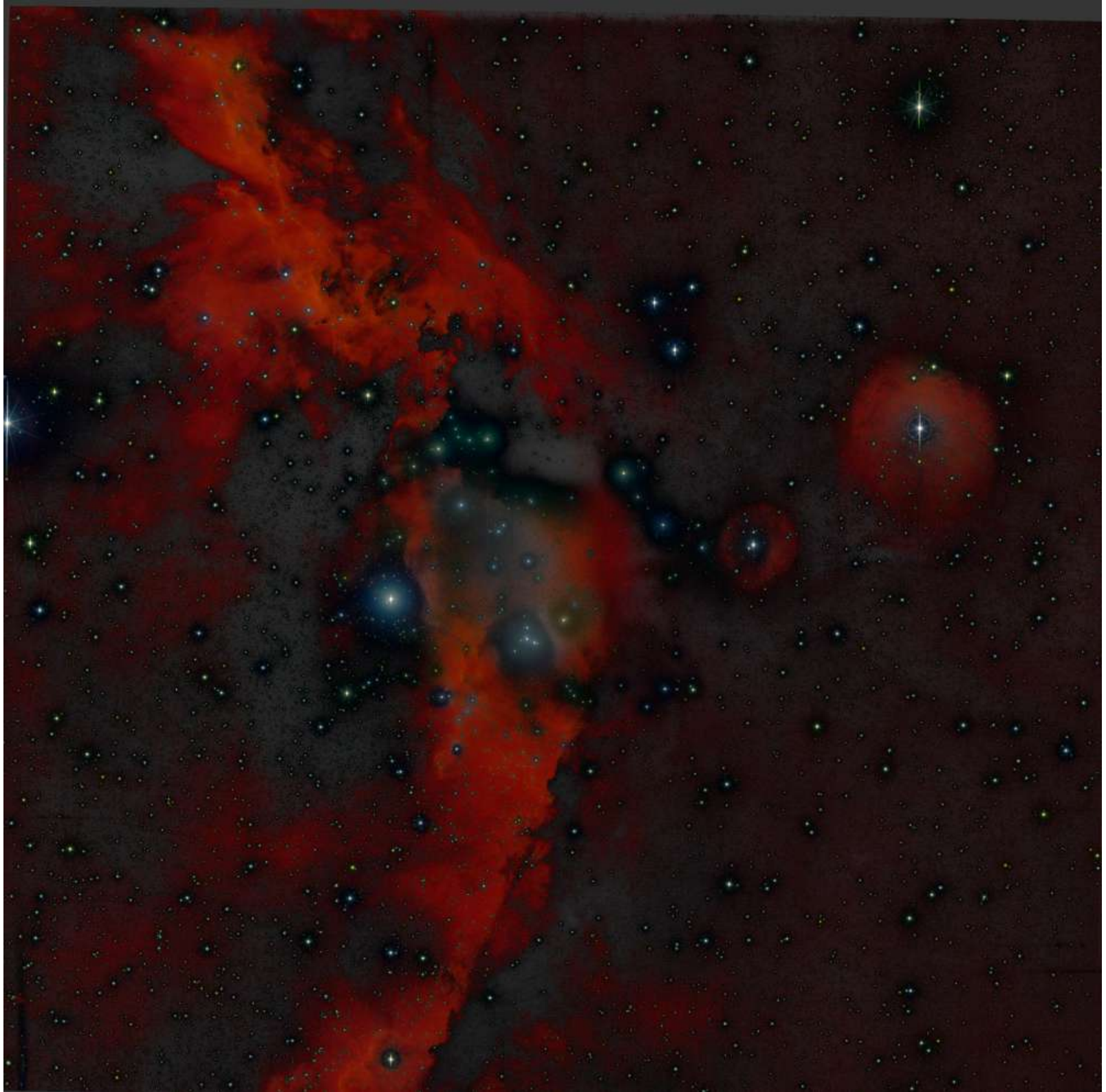
4. Galactic Survey (GS):

- It will cover an area of about 1300 deg^2 in the Milky Way plane in all the 12 filters, covering two regions down to MS depth:

  - in the bulge (350º<l<10º and -15º<b<+5º)
  - in the disk (220º<l<278º and -15º<b<+5º)

- A shallower 2nd and 3rd epoch data with exp. times of 1/12 of the MS exposure times using only r, i and H_α will follow at random cadence and over the years to study variability.

- Observations with two exp. times will cover a range in magnitudes, allowing us to sample different stellar populations while the variability data are suitable to the detection of variable sources, including pulsating RR-Lyrae, Cepheids, Cataclysmic variables and eclipsing variables as well as transient sources such as Galactic Nova. +400 Open Clusters will be observed.



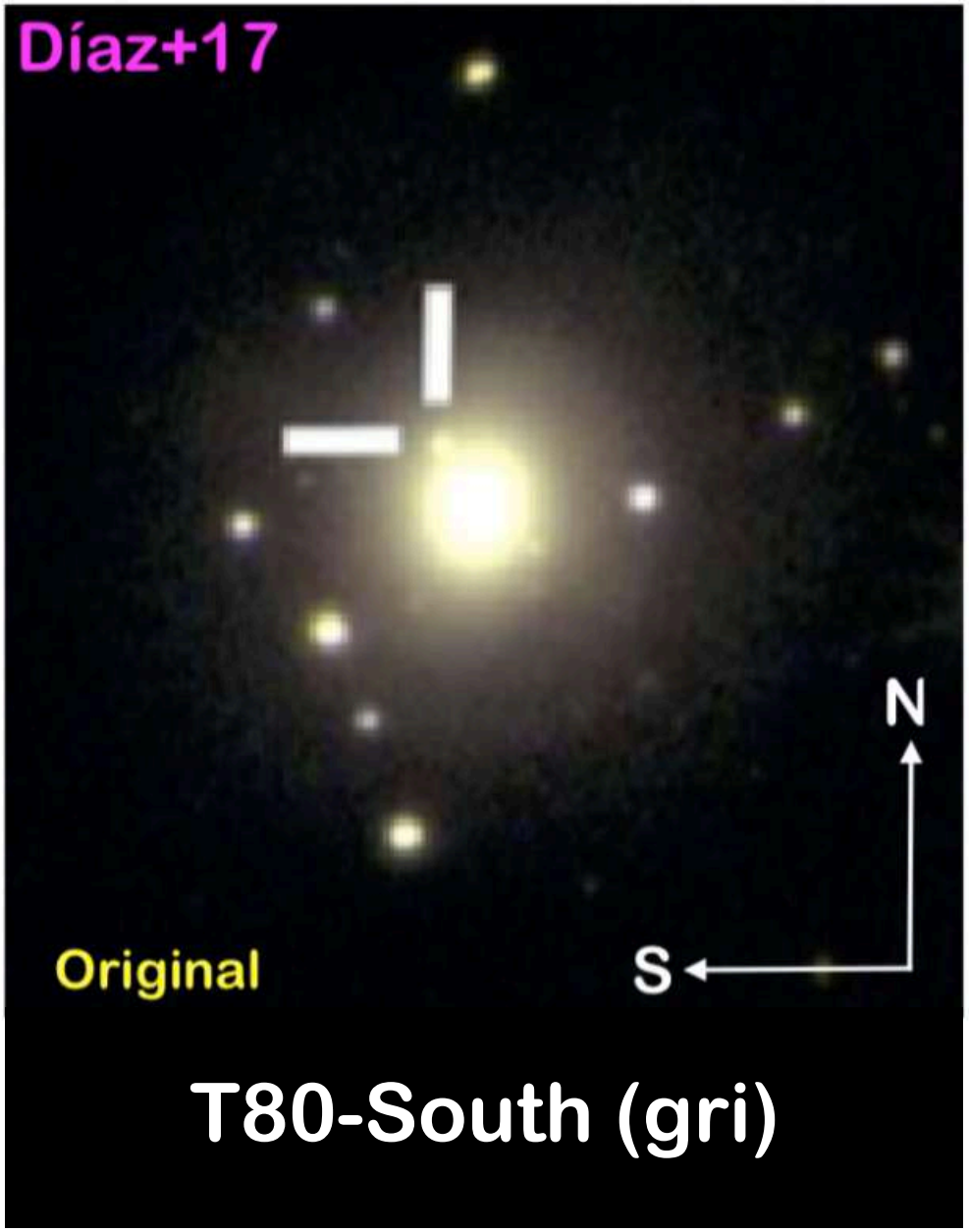
9300 deg^2 in 5 sub-surveys

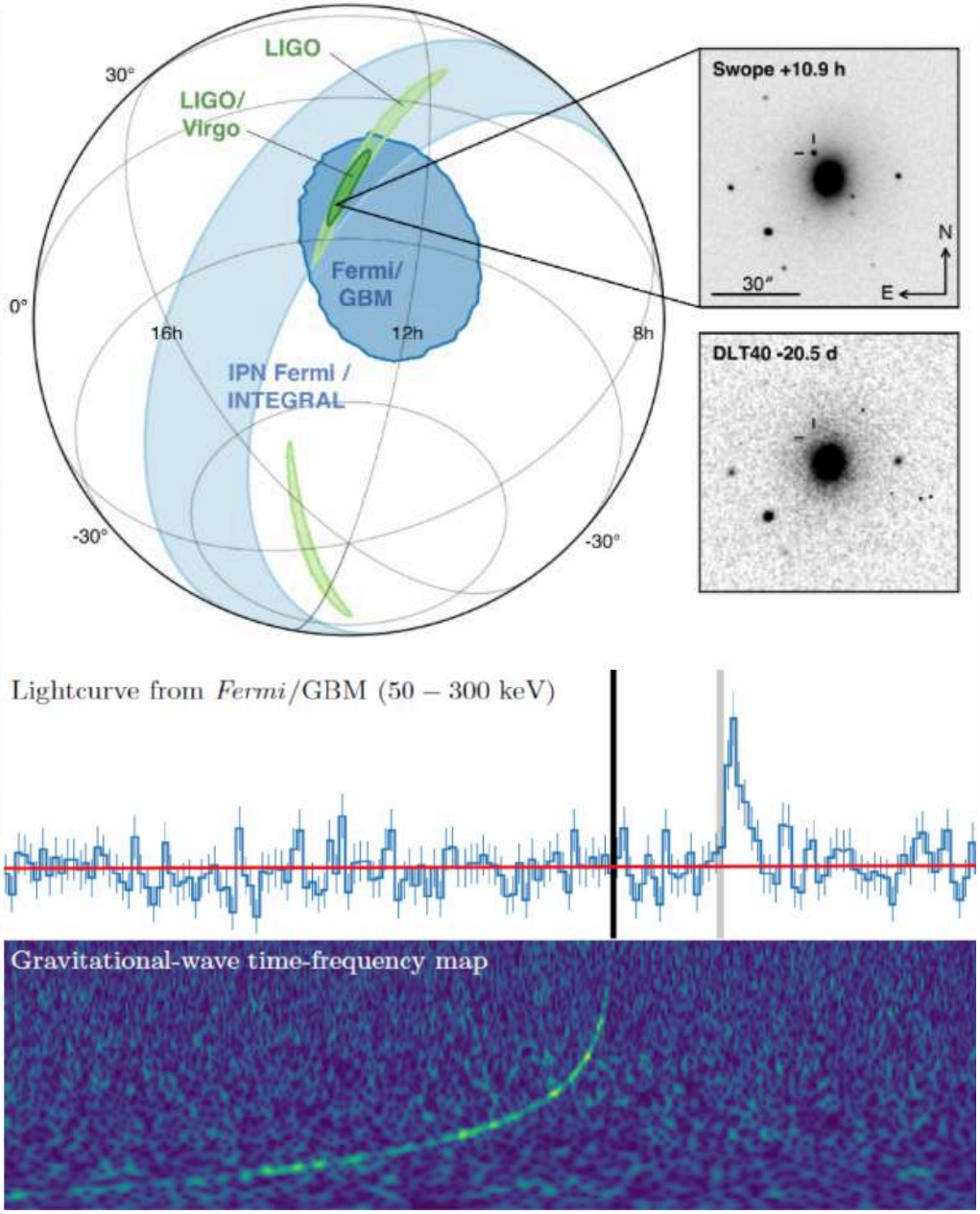
5. Variability fields:

- The time to be dedicated to the VFS will be open for proposals every year - to use non-photometric nights in S-PLUS, when the Galaxy is not up. Up to now J-VAR is the only project being observed.

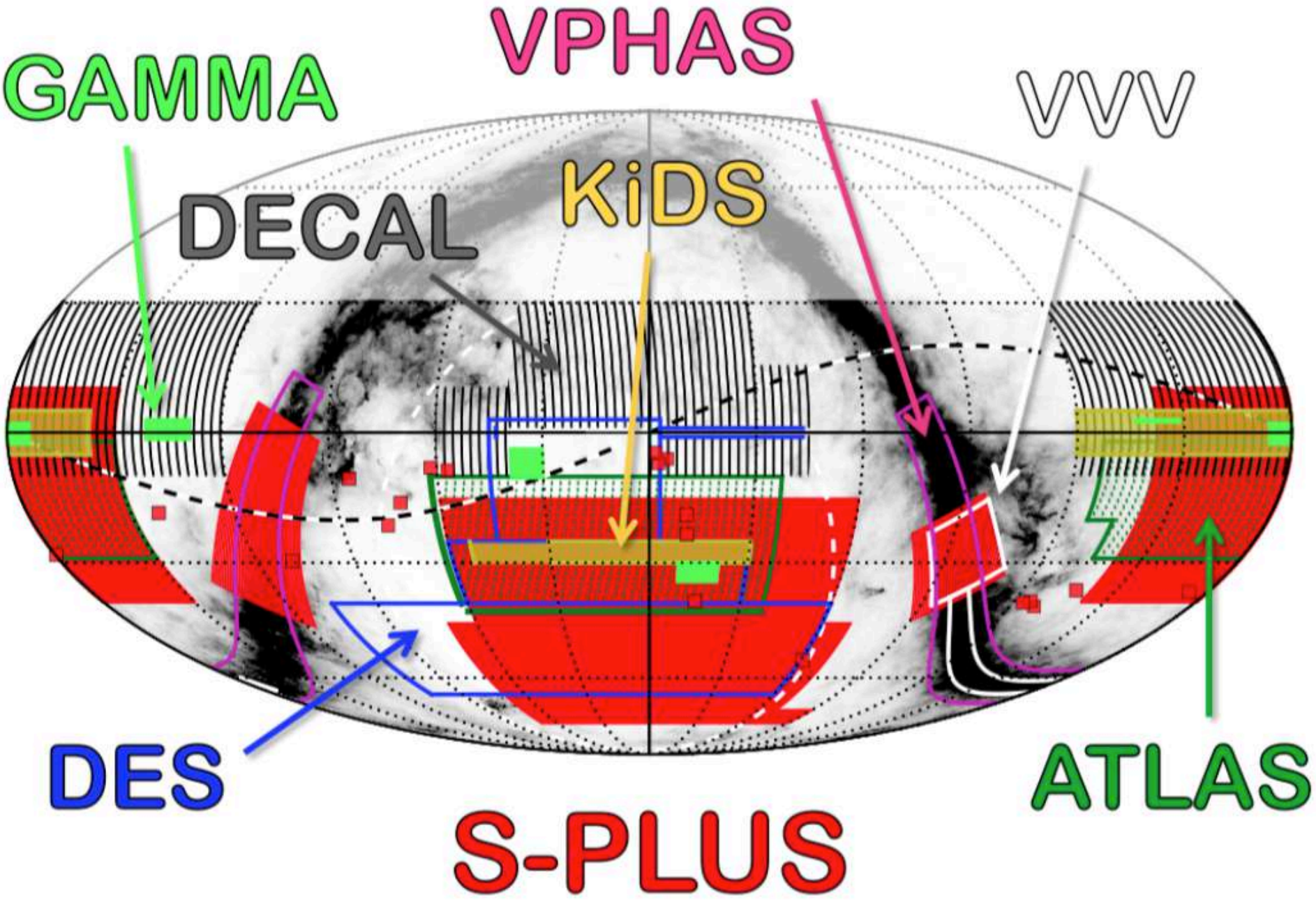
- The main scientific goal is to study variable sources, in particular cataclismic variables.

Multi-wavelength follow-up of Gravitational waves



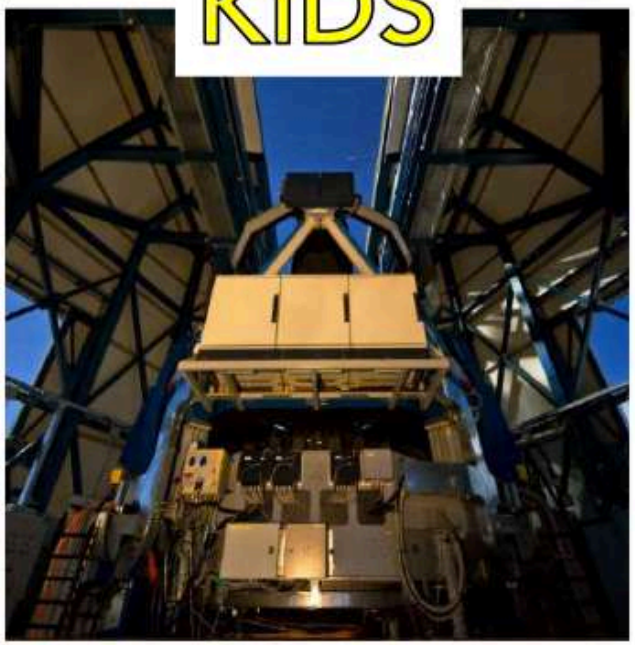


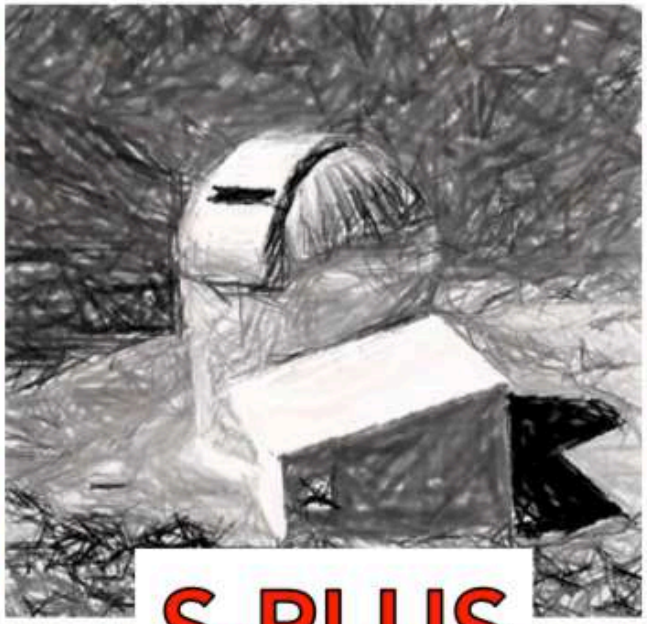
How does S-PLUS compare to other photometric surveys in the Southern Hemisphere?


GAMMA
VPHAS
VVV
DECAL
KiDS
DES
ATLAS
S-PLUS

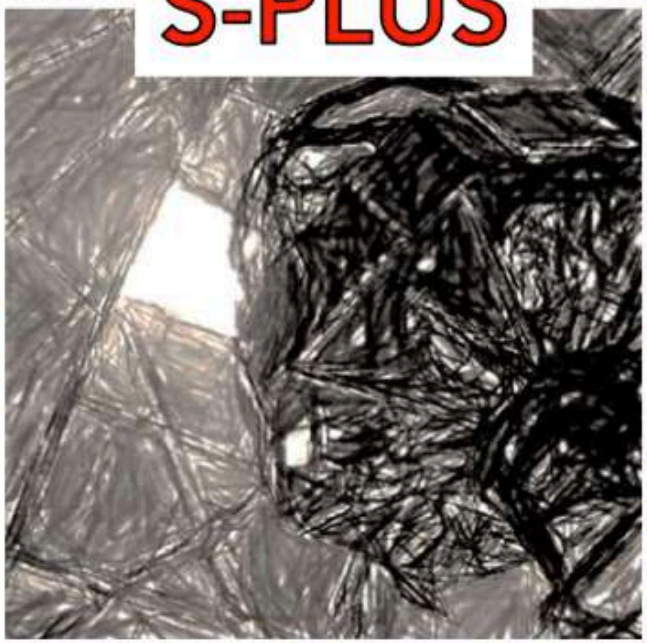
VST/@2.5m T80S/@0.8m BLANCO/@4.0m

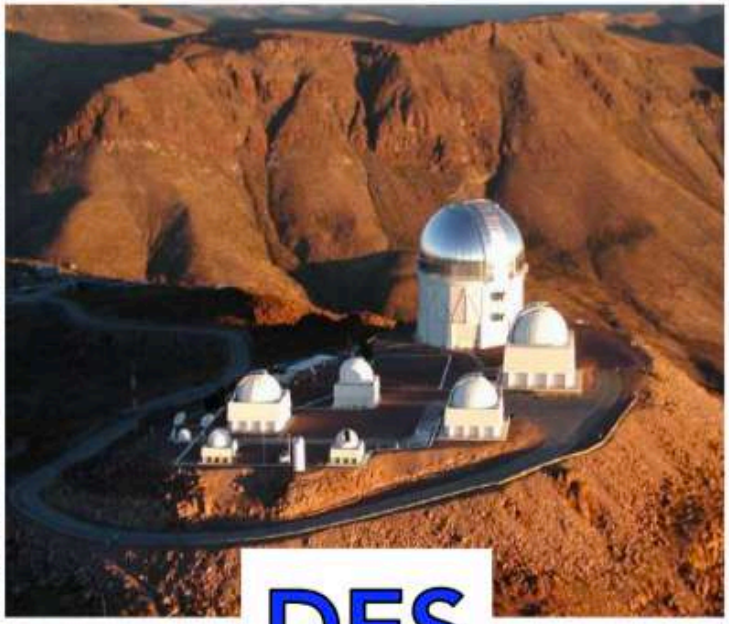
KiDS



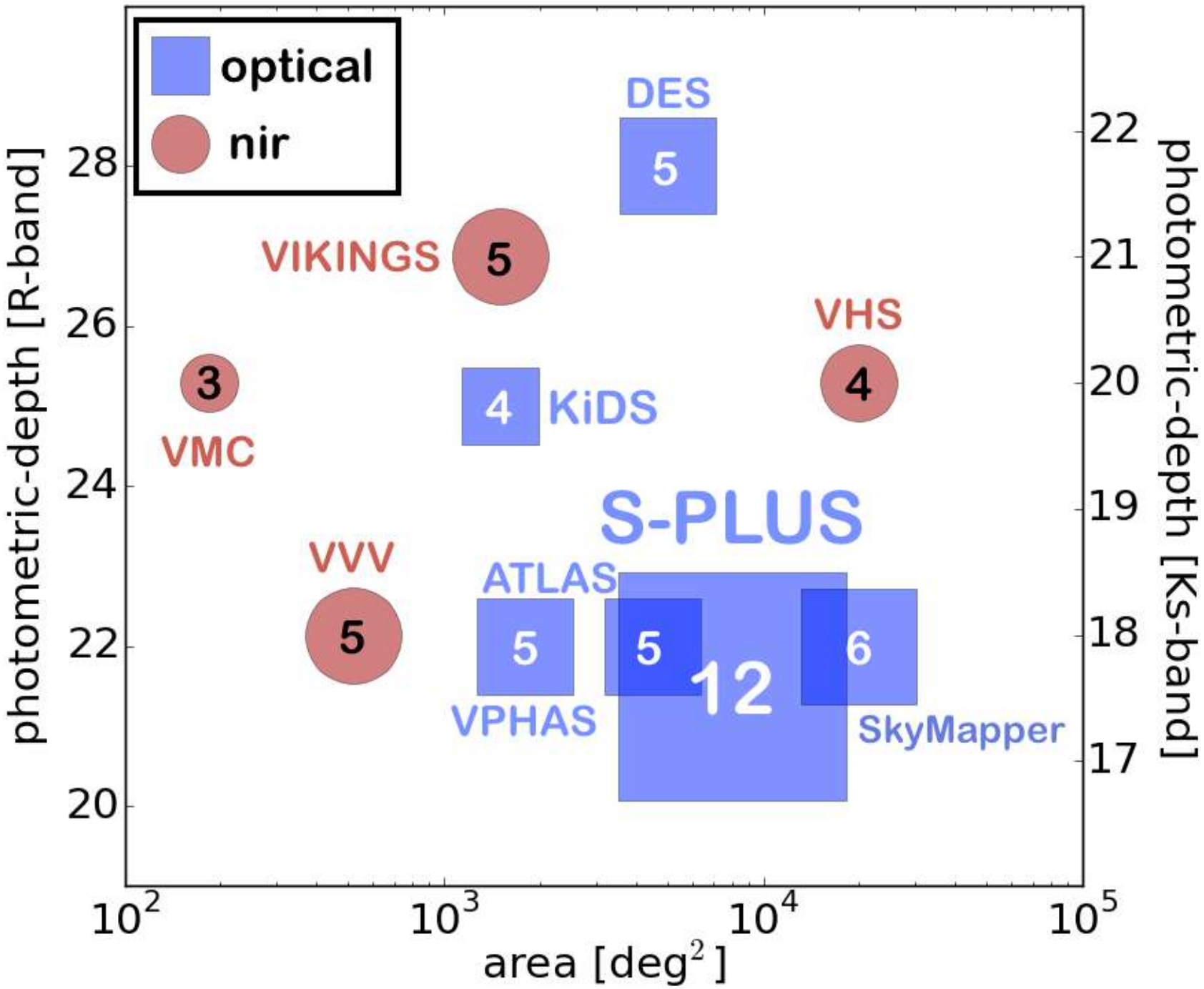


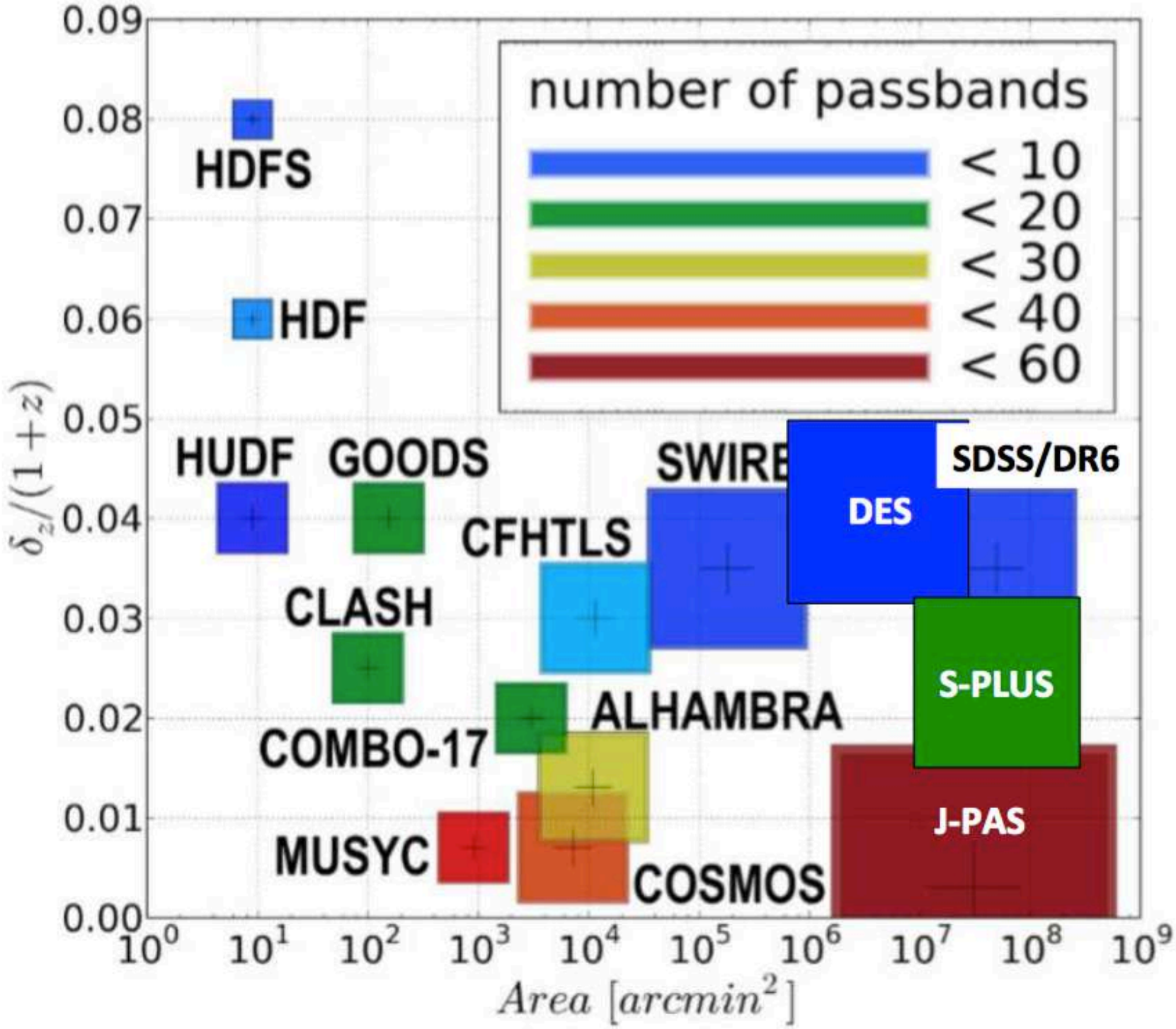
S-PLUS





DES


optical
nir
DES
5
VIKINGS
5
VHS
4
3
VMC
4
KiDS
S-PLUS
VVV
5
ATLAS
5
5
12
6
VPHAS
SkyMapper
28
26
24
22
20
22
21
20
19
18
17
10^2
10^3
10^4
10^5
photometric-depth [R-band]
photometric-depth [Ks-band]
area [deg^2]


number of passbands
< 10
< 20
< 30
< 40
< 60
HDFS
HDF
HUDF
GOODS
CFHTLS
SWIRE
DES
SDSS/DR6
CLASH
S-PLUS
ALHAMBRA
COMBO-17
J-PAS
MUSYC
COSMOS
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
$\delta_z/(1+z)$
10^0 10^1 10^2 10^3 10^4 10^5 10^6 10^7 10^8 10^9
$Area\ [arcmin^2]$

Photometric Redshifts

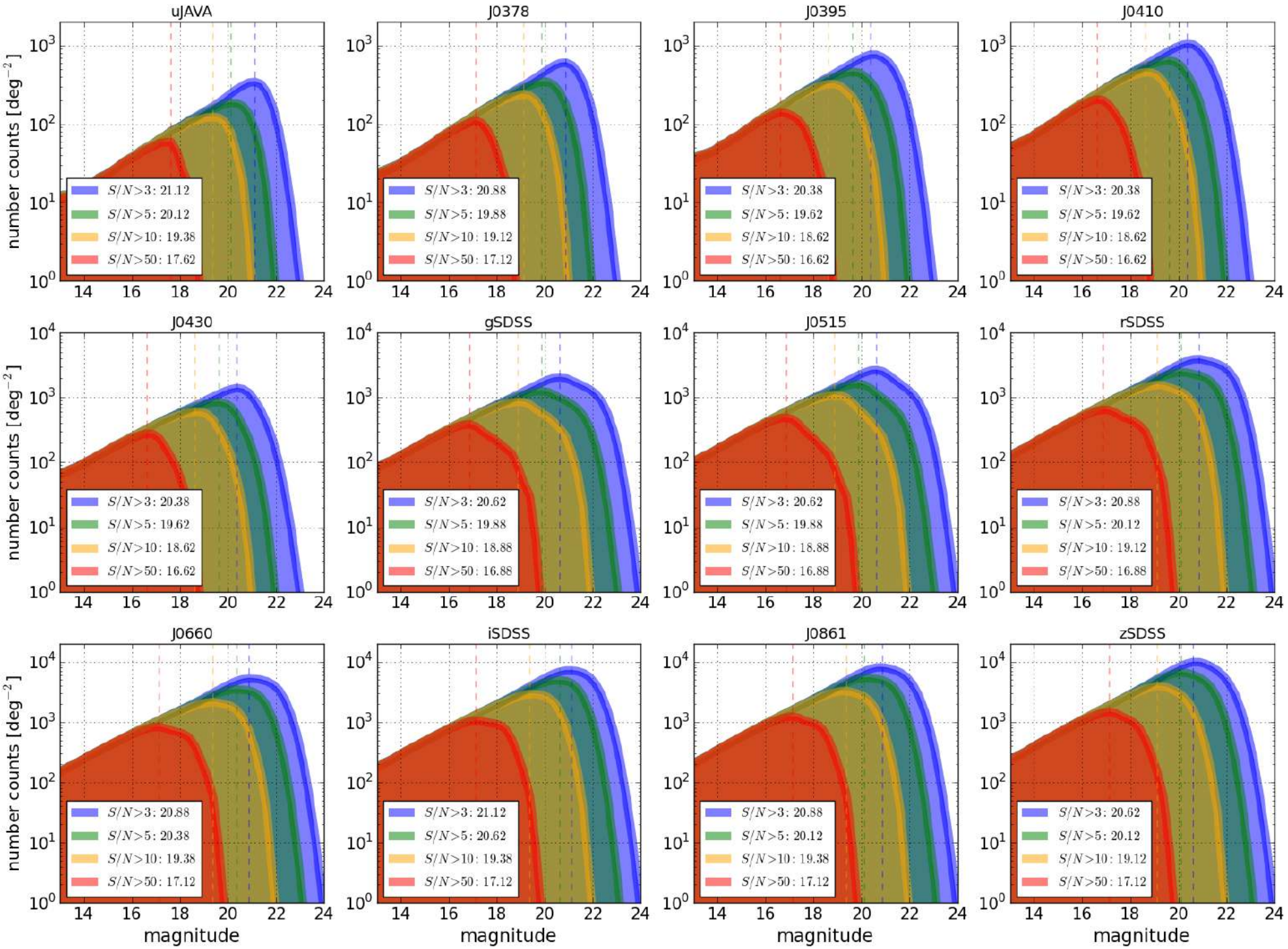
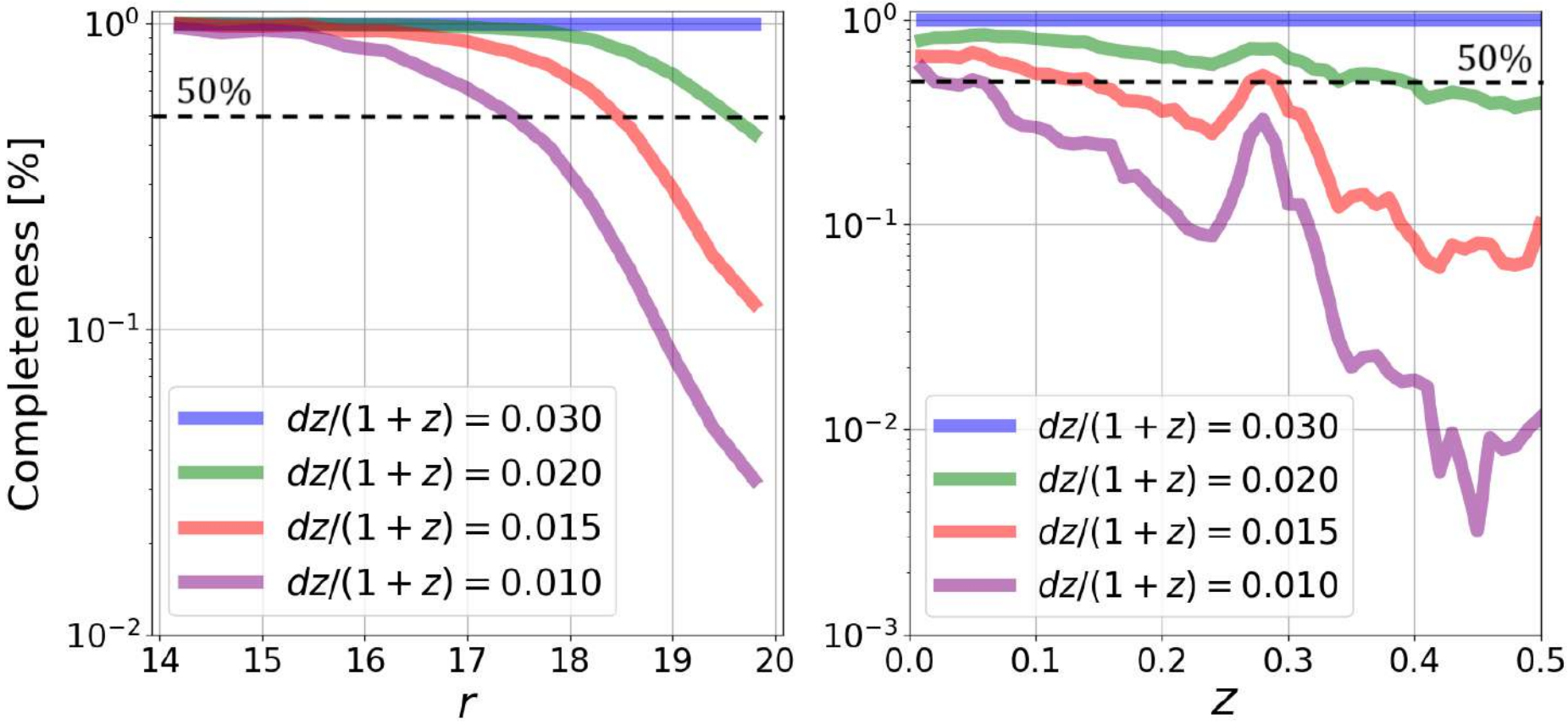

uJAVA
S/N>3: 21.12
S/N>5: 20.12
S/N>10: 19.38
S/N>50: 17.62
J0378
S/N>3: 20.88
S/N>5: 19.88
S/N>10: 19.12
S/N>50: 17.12
J0395
S/N>3: 20.38
S/N>5: 19.62
S/N>10: 18.62
S/N>50: 16.62
J0410
S/N>3: 20.38
S/N>5: 19.62
S/N>10: 18.62
S/N>50: 16.62
J0430
S/N>3: 20.38
S/N>5: 19.62
S/N>10: 18.62
S/N>50: 16.62
gSDSS
S/N>3: 20.62
S/N>5: 19.88
S/N>10: 18.88
S/N>50: 16.88
J0515
S/N>3: 20.62
S/N>5: 19.88
S/N>10: 18.88
S/N>50: 16.88
rSDSS
S/N>3: 20.88
S/N>5: 20.12
S/N>10: 19.12
S/N>50: 16.88
J0660
S/N>3: 20.88
S/N>5: 20.38
S/N>10: 19.38
S/N>50: 17.12
iSDSS
S/N>3: 21.12
S/N>5: 20.62
S/N>10: 19.38
S/N>50: 17.12
J0861
S/N>3: 20.88
S/N>5: 20.12
S/N>10: 19.38
S/N>50: 17.12
zSDSS
S/N>3: 20.62
S/N>5: 20.12
S/N>10: 19.12
S/N>50: 17.12
number counts [deg^{-2}]
magnitude

Photo-z depth: Completeness

Averaging over all spectral-types

Molino et al., submitted



Photometric redshift completeness using DR1 (Molino et al. submitted) – fraction of galaxies per mag and z bin with a maximum photoz error. Solid lines sample of 41k galaxies with spectroscopic z information. A photoz precision of 0.02 is expected for 50% of galaxies with magnitude < 19.5 or z < 0.4. And 0.01 for 10% of galaxies with mag r< 18.8 and z < 0.3.

Photometric redshifts (photo-zs) with S-PLUS

M.L. Buzzo and E. Vinicius-Lima

Le PHARE - Template-Fitting

- Precision of 1%, 2% and 3% for r<17, r<19 and r<21.3

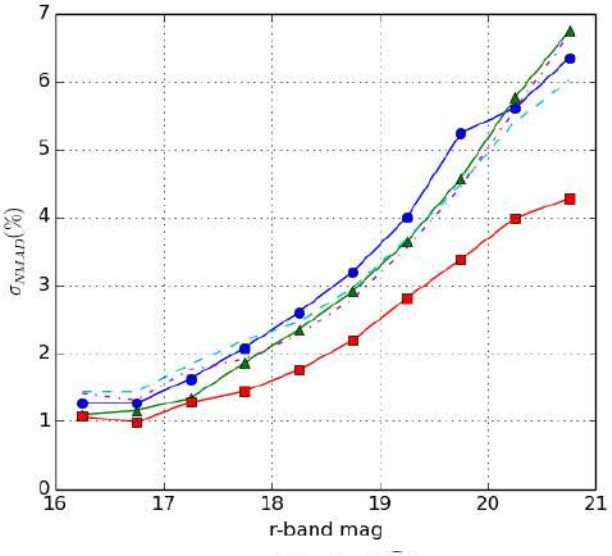
Photo-z + Spectral Types + Physical Properties

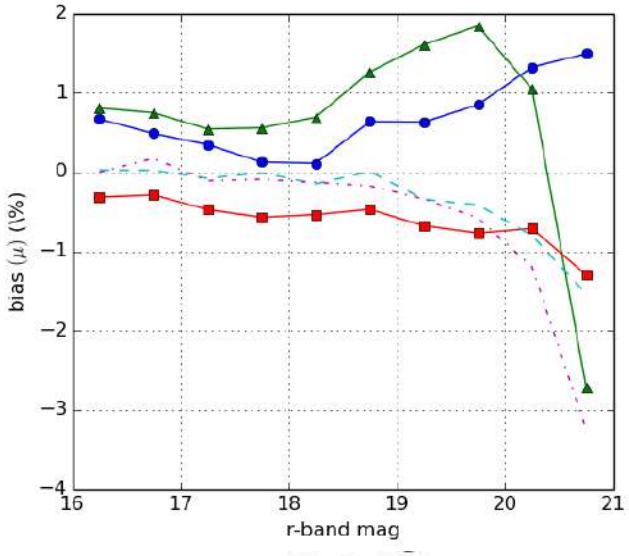
Best world: hybrid methods

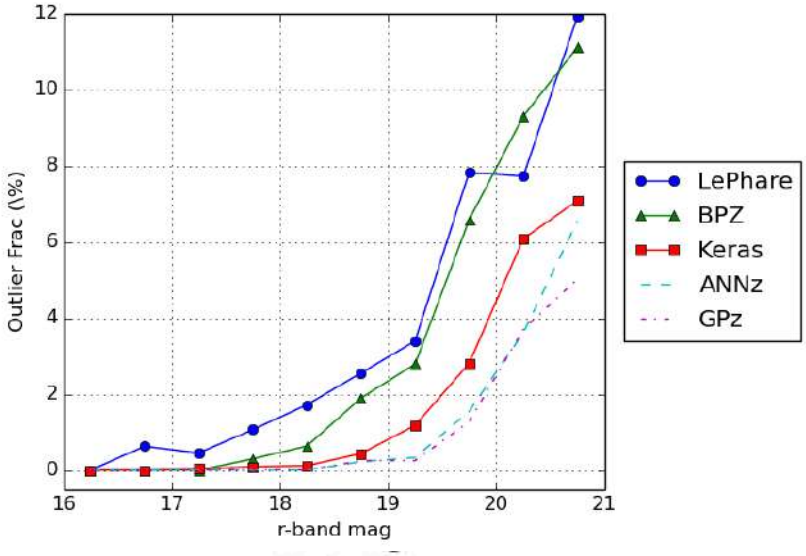
Machine Learning

- Precision of 1.05%, 1.75% and 2.49% for r<17, r<19 and r<21.3

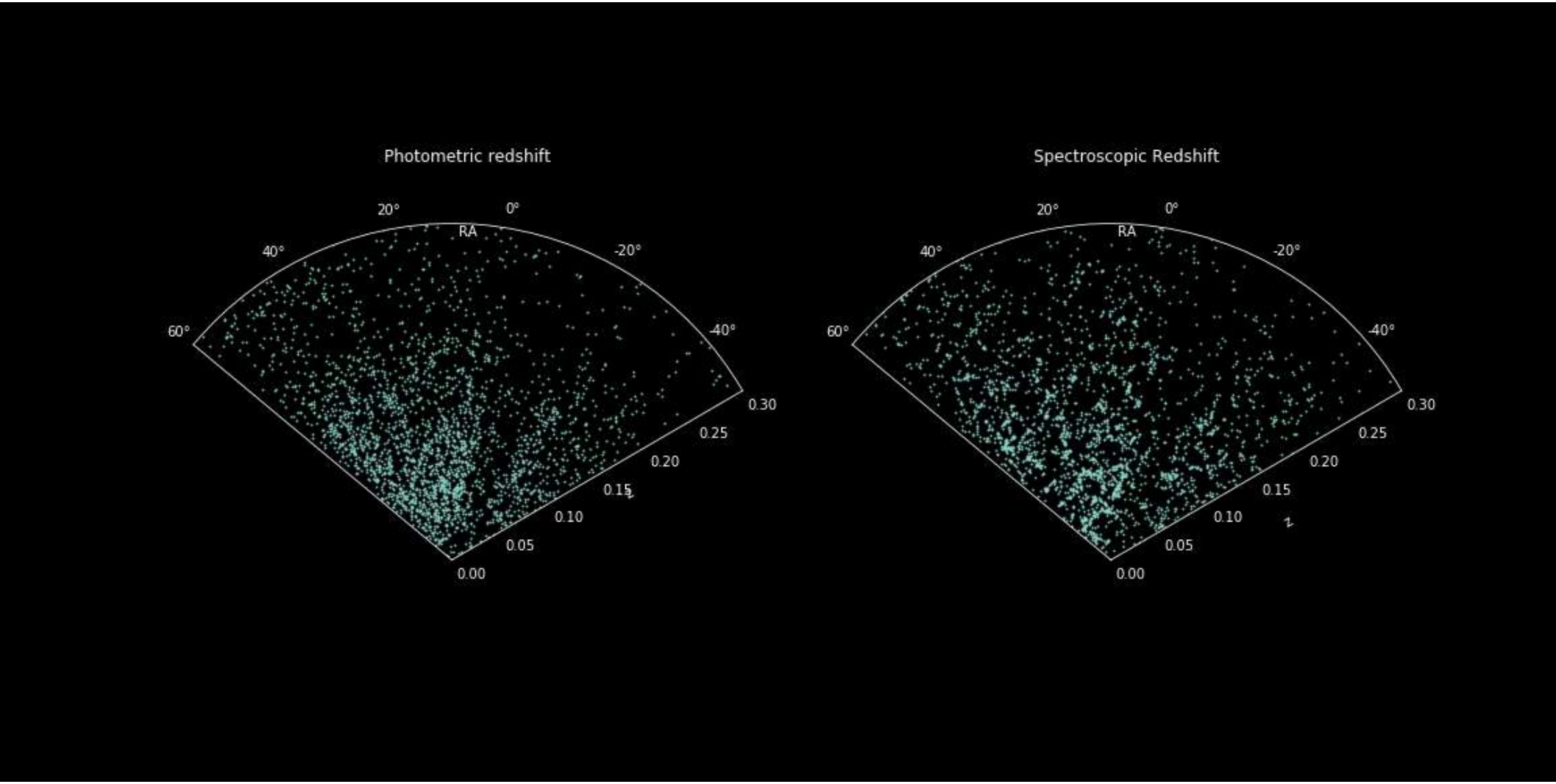
High-Accuracy photo-z





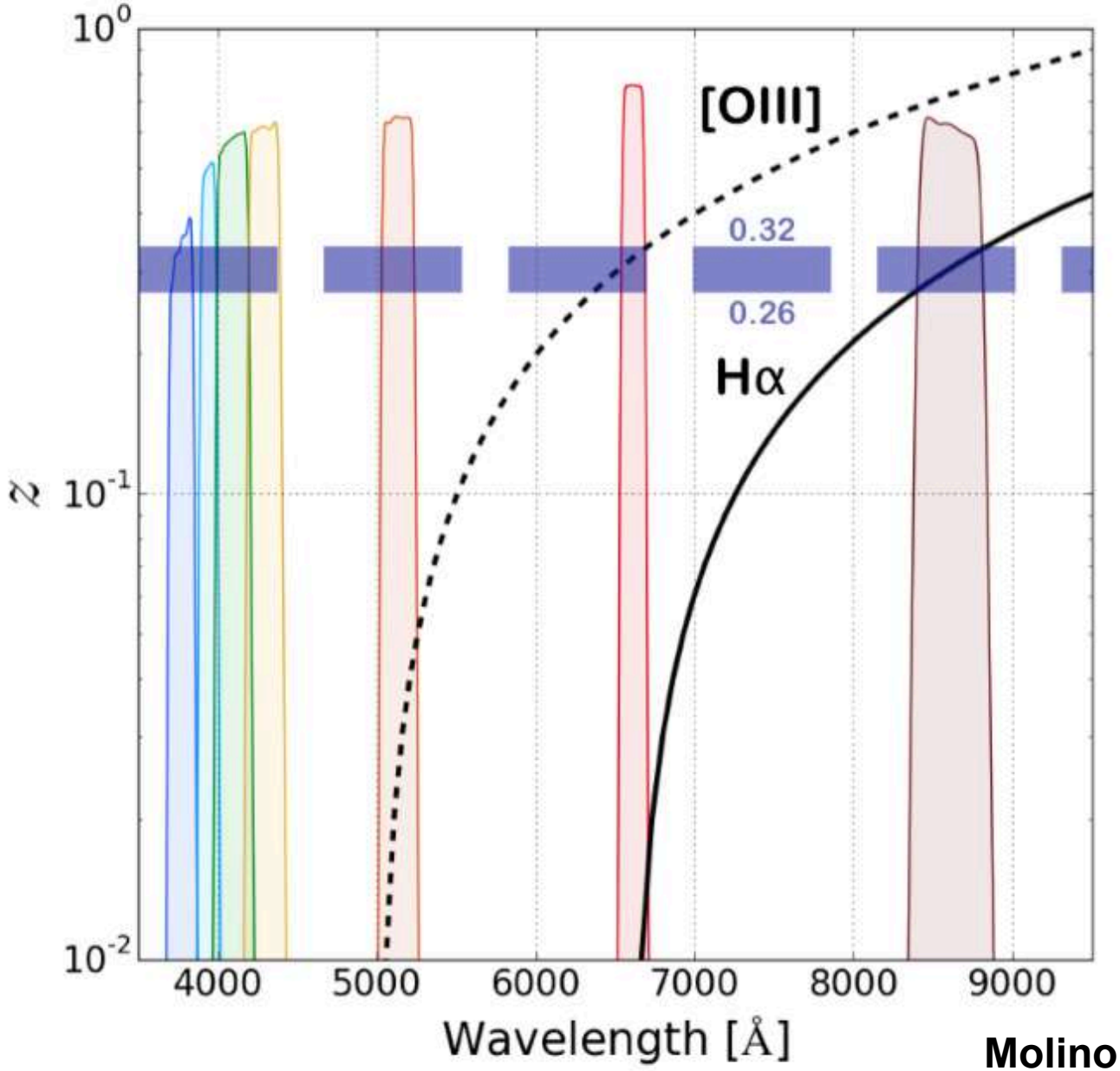


Large scale structure using S-PLUS photo-zs



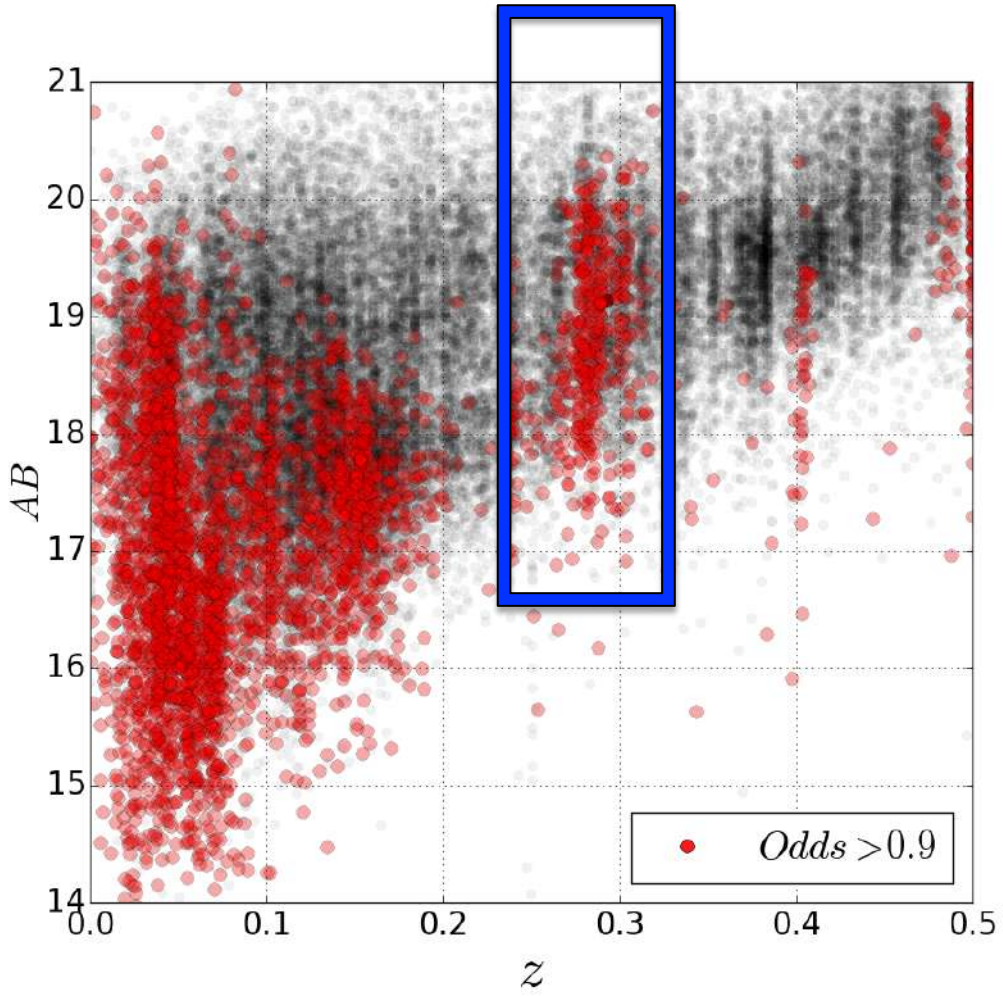
M. L. Buzzo and E. Vinicius-Lima

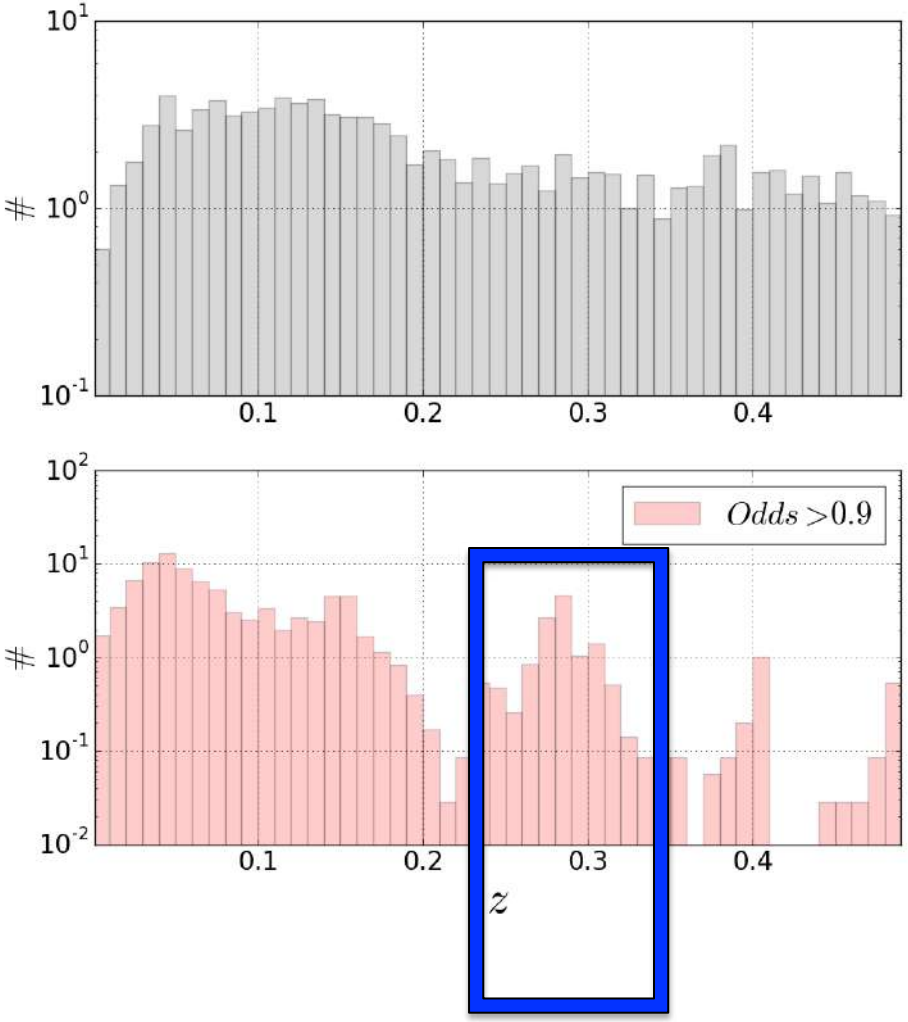
Redshift Window Opportunity for ELGs at z~0.3



Molino et al., submitted

Redshift Window Opportunity for ELGs at z~0.3





S-PLUS projects in the wiki

#001: S-PLUS Survey Overview Paper (PL: Claudia Mendes de Oliveira)
#002: Large-scale structures in the local Universe: clustering properties of groups and clusters at extremely low redshifts (PL: Raul Abramo)
#003: Identification and characterization of WD+M binaries (PL: Tiago Ribeiro)
#004: Luminous Quasars near the end of Re-ionization (PL: Roderik Overzier)
#005: Technical documentation for the wiki (PL: Roderik Overzier)
#006: Identifying Metal-Poor Stars from the SPLUS Survey (PL: Vinicius Placco)
#007: An accurate photo-z catalogue for nearby galaxy clusters in the South hemisphere (PL: Alberto Molino)
#008: The Largest Astrometric and Photometric Open Cluster (LAPOC) Catalogue. (PL: Laura Sampedro)
#009: Configuration of Artificial Neural Network Pipeline for CEMP Candidate Identification (Devin Whitten)
#010: Blue stars in the Galactic Halo (PL: Marcelo Borges)
#011: Identifying BSS and BHBs (PL: Rafael Santucci)
#012: Southern Galactic Halo Age-maps (PL: Rafael Santucci)
#013: SPLUS mock catalogs using GALFAST code (PL: Rafael Santucci)
#014: PNe and symbiotics in the Galactic halo and nearby galaxies (PL: Denise Gonçalves)
#015: Learning about stars from their S-PLUS colors (PL: Tiago Ribeiro)
#016: Star/galaxy separation in multi-band photometric surveys based on machine learning techniques (PL: Walter Santos)
#017: The environment of Lyman break analogs (PL: Thiago Gonçalves)
#018: A Panchromatic (FUV-OPT-MIR) study of the energy output of the Local Universe (PL: Alberto Molino)
#019: An alternative methodology to calibrate the S-PLUS survey (PL: Laura Sampedro)
#020: Short period variables (PL: Antonio Kanaan)
#021: S-PLUS morphology classification (PL: Arianna Cortesi)
#022: Unveiling the nature of unknown gamma-ray sources (PL: Raniere Menezes)
#023: Luminosity function of compact groups of galaxies in Stripe 82 (PL: Sergio Torres Flores)
#024: Star formation in compact groups observed by SPLUS (PL: Sergio Torres Flores)
#025: Unveiling star-forming early-type galaxies in dense environments using the S-PLUS survey (Riguccini)
#026: The differential evolution of the star formation in low mass galaxy clusters from the perspective of the S-Plus Survey. (PL: Jose Nilo Castellon)
#027: Mapping stellar streams and substrucures in the galactic halo (PL: Hélio J. Rocha Pinto)
#028: Nature of the Galactic substructures located in low latitudes fields (PL: Hélio J. Rocha Pinto)

#029: S-plus catalog of interacting galaxies: stellar populations and star formation rates (PL: J. Jimenez)
#030: Star Formation in the Local Universe (PL: Claudia Mendes de Oliveira)
#031: Emission lines and diagnostic diagrams using the machine learning approach (PL: Marcus Duarte)
#032: Galaxy environment using photometric redshifts in SPLUS (PL: Marcus Duarte)
#033: Application of Machine Learning Techniques on Astronomical Data (PL: Rodrigo Clemente Thom de Souza)
#034: Satellites of Bright Galaxies in the Nearby Universe (PL: Laerte Sodré Jr.)
#035: Mapping stellar populations of galaxies in the nearby universe (PL: Carlos Barbosa)
#036: Photometric survey of Galactic star forming regions (PL: Jane Gregorio-Hetem)
#037: Determining ages and metallicities of LMC and SMC star clusters using the S-PLUS filter system (PL: Pieter Westera)
#038: S-PLUS Galactic Globular Cluster Survey (PL: Charles Bonatto)
#039: Compact stellar systems (GCs, UCDs) in nearby systems and different environments (PL: Ana Chies Santos)
#040: The search for transition galaxies in groups/clusters —> the Jelly Fish Galaxies in the nearby Universe (PL: Ana Chies Santos)
#041: Prompt follow-up of Gamma Ray Bursts (PL: William Schoenell)
#042: Searching for extended circumgalactic halo around galaxies (PL: Luiz Azanha)
#043: Studying large scale structure with S-PLUS (PL: Stephane Vaz Wener)
#044: Studying type Ia supernova host galaxies properties (PL: Ribamar Reis)
#045: Low surface brightness galaxies in S-PLUS (PL: Carlos Eduardo Barbosa)
#046: Identification of radio sources in the Stripe82 (Pilot) (PL: Roderik Overzier)
#047: Galaxy morphologies and star formation quenching as a function of environment in and around the Hydra cluster (PL: Ciria Lima)
#048: Tidal effects on hot dynamical systems (PL: Jose Hernandez-Jimenez)
#049: Building an LRG sample for clustering studies (PL: Antonio Montero-Dorta)
#050: The Red-Cluster Sequence of Galaxies through the eyes of the S-PLUS survey (PL: J.L. Nilo Castellón)
#051: Narrow band photometry of Green Valley Galaxies (PL:Jose Luis Nilo Castellón)
#052: Star-forming Main Sequence in the Local Universe (PL: Jose Hernandez-Jimenez)
#053: Star/galaxy separation and galaxy morphological classification with Convolutional Neural Networks (CNNs) (PL: Guillermo Damke)
#054: Lenticular Galaxies in Stripe 82 (LEGS82) (PL: Arianna Cortesi)

T80-South Telescope – Chilean time call for proposals 2018A, 2018B, 2019A, 2019B, 2020A

T80S is a queue-scheduled robotic 0.8m telescope at CTIO. The telescope was designed to do a Sloan-like imaging survey in 12 filters (u',g',r',i',z' + 7 narrow-band filters, listed below). Proposers are strongly encouraged to use the full 12-filter set for their observations, as this will make the scheduling easier. The imager has an E2V 9.2x9.2 pixel CCD, giving 0.55 arcsec/pixel over a 1.4x1.4 degree field.

We expect that 17 nights, of 8 hours each, will be available for the 2019B semester. If the telescope is closed for technical problems or engineering for any substantial amount of time in the semester, all users will have their times proportionally reduced.

Successful proposers will be given instructions on how to format their observing plans so that they can be incorporated into the queue. In the interest of maximising the scientific return of the T80S, we advise that proposers avoid targeting fields within the footprint of the S-PLUS survey (see file on CNTAC webpage). If you want to observe targets within this region, you should contact the PI of S-PLUS (Claudia Oliveira - claudia.oliveira@iag.usp.br) in advance of writing your proposal. Due to limited resources, we cannot guarantee to pipeline-reduce any of the Chilean Time data at this time, but we will deliver the raw images and appropriate calibration frames. Please note that if calibration images are needed, they should be included in the proposed time.

Take-home lessons 1

- S-PLUS is a 12-band optical survey done with T80-South, at Tololo, that started in August 2017, aiming at imaging >9300 deg^2 in 5 years. Complements similar data set from J-PLUS, done over the sloan footprint.

- The combination of a Wide FoV telescope+camera ($2deg^2$) with 5 broad +7 narrow-band filters, will allow us to study and review a number of scientific topics, from solar system to cosmology.

- Photo-z precision surpasses those from other overlapping photometric surveys, making it possible to revisit membership analysis of nearby clusters of galaxies.

- S-PLUS allows a pixel-by-pixel SED analysis of the Sky (i.e., IFU-like science) for resolved nearby galaxies.

- Niche for low-metallicity, carbon-enhanced stars searches.

Take-home lessons 2

- S-PLUS is ongoing without any major problems since 2018A. We are about to cross the 30% milestone in the area of the total survey.
- DR1 was released, a number of members are using the data, please report to the group about problems. Four papers published, submitted, a dozen ongoing theses or completed using DR1 data.
- iDR2 was released last December and DR2 will be released in October 2020.
- We have a team working with deadlines to make sure the data releases will be out to the community and the world in time.
- Tools built for S-PLUS can in the future be used for the J-PAS project
- Colleagues from the Argentinian community are welcome to the collaboration. They can (1) become external collaborator or (2) request full membership - we are open to discussing this for anyone, in principle.

You are invited to the next S-PLUS meeting at IAG, on May 4-6, 2020!

SUPPORTERS

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