WINGS survey of local clusters of galaxies

The database

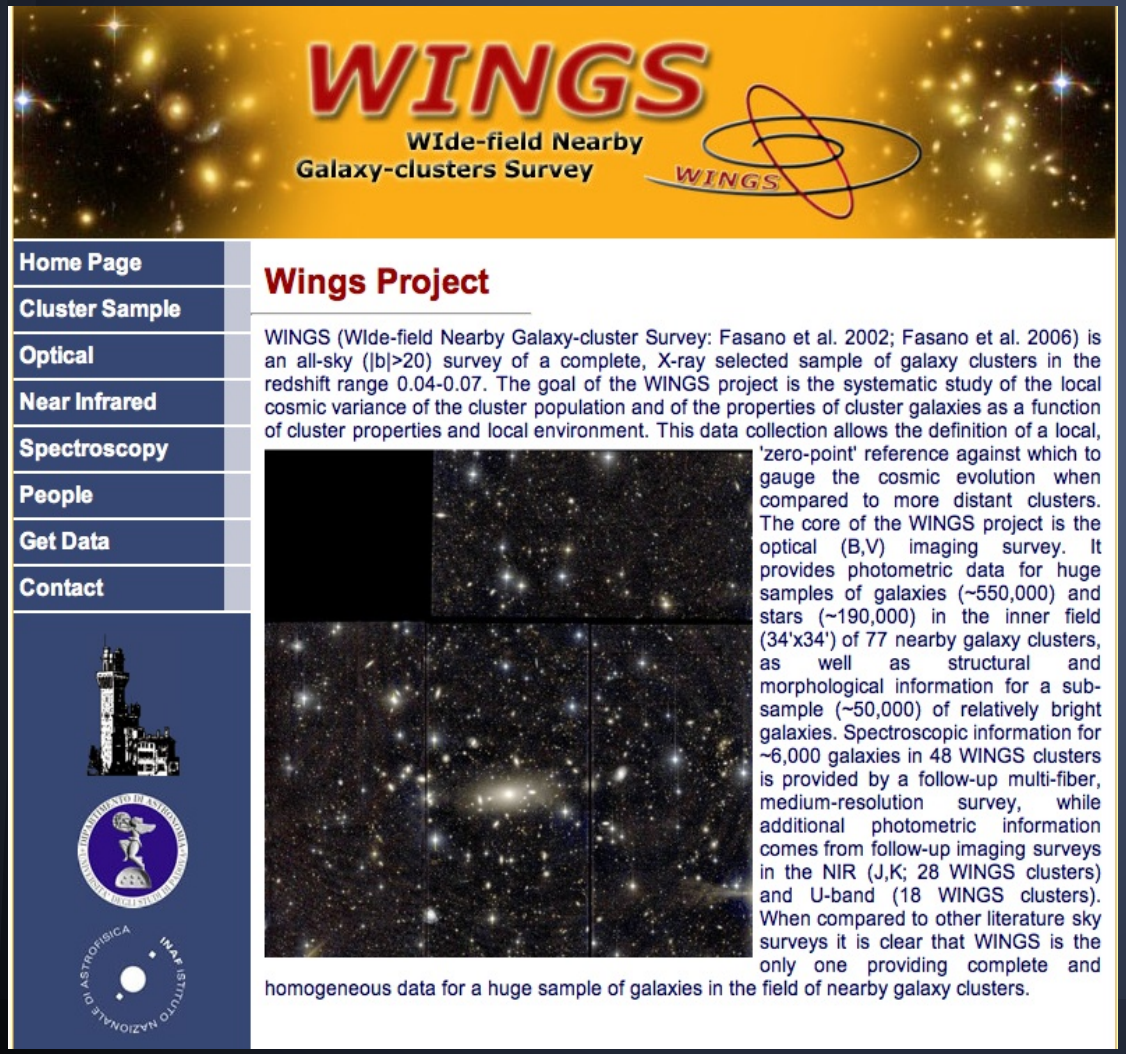
A. Moretti for the WINGS team
Padova University/INAF-OaPD

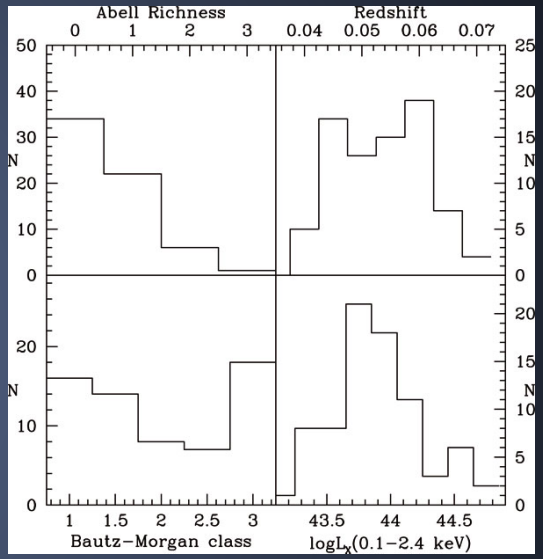
Fasano
Poggianti
Bettoni
D'Onofrio
Omizzolo
Gullieuszik
Valentinuzzi
Bindoni

Couch
Dressler
Moles
Kjaergaard
Fritz
Cava
Varela

Surveys 2012 - Munich, 13-20 Oct

The survey





76 clusters
(36 north and 42 south)

0.04<z<0.07

Fasano et al., 2006

WINGS data (raw)

Photometric

B,V wide field (34'x 34') (INT, WFI) [WINGS-OPT, 76 clusters]

J, K wide field photometry (UKIRT) [WINGS-NIR, 28 clusters]

U wide field photometry (BOK, INT, LBT) [WINGS-U,9 & 11 clusters)

V,B,u' wide wide field (VST) [OMEGA-WINGS, 59 clusters]

Spectroscopic

WYFFOS (north) & 2dF (south) spectra for ~6000 objects [WINGS-SPE, 48 clusters]

WINGS science
B & V photometry

Fasano et al., 2006
Ramella et al., 2007
Fritz et al., 2007
D'Onofrio et al., 2008
Cava et al., 2009
Varela et al., 2009
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Vulcani et al., 2011a
Vulcani et al., 2011b
D'Onofrio et al., 2011
Bettoni et al., 2011
Valentinuzzi et al., 2011
Fasano et al., 2012
Vulcani et al., 2012

V band used for detection/photometry

Big haloes separately analyzed

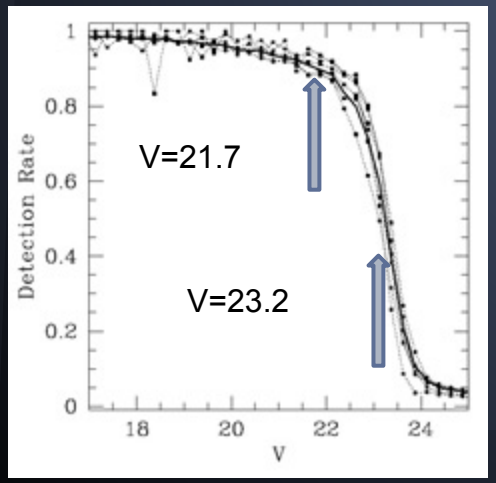
Detection limit at m_V~25.7 mag/arcsec^2 (0.6 deeper than SDSS)

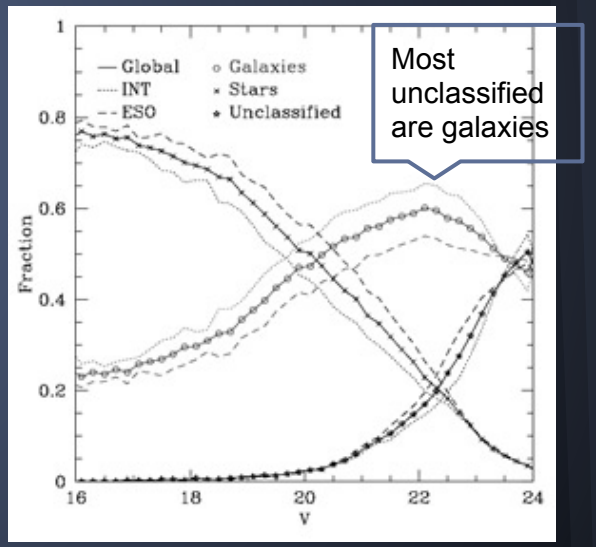
Rejection of detections in only 1 band

Classification using sextractor stellarity

(Gx <=0.2; ~400000)

Simulations on each field to compute completeness





WINGS science
Spectroscopy

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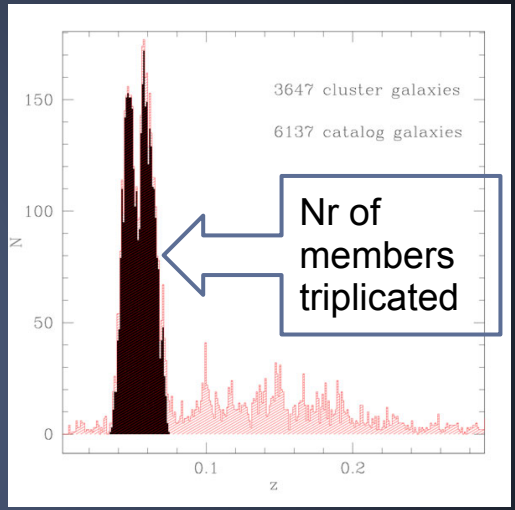
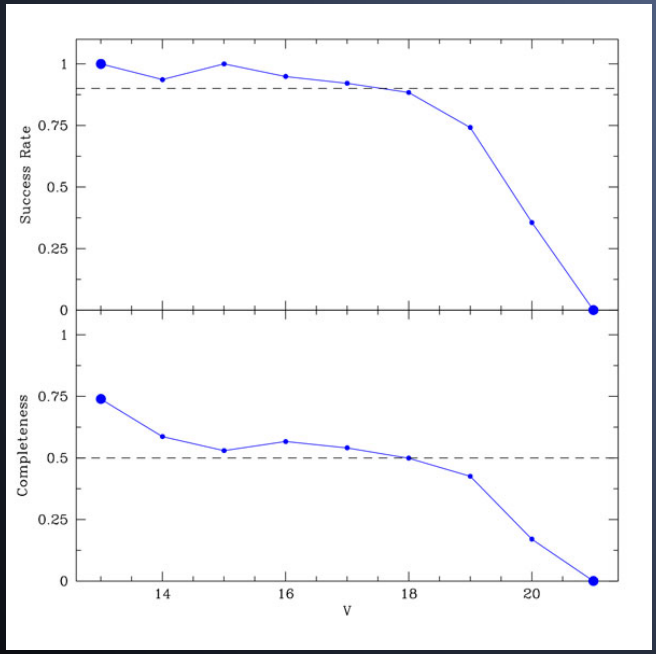
Vulcani et al., 2012

48 clusters (26 N, 22 S) - ~6000 galaxies
(30% of which already in literature)
WYFFOS@WHT 1.6" 3800-7000 A
2dF@AAT 2" 3600-8000 A





Nr of successful redshift measurement / number of spectra
Nr of spectra / Nr of photometric objects with same cuts

SPECTROSCOPIC completeness (to be used when studying magnitude limited properties (21 clusters have completeness > 50%)

WINGS science
J & K photometry

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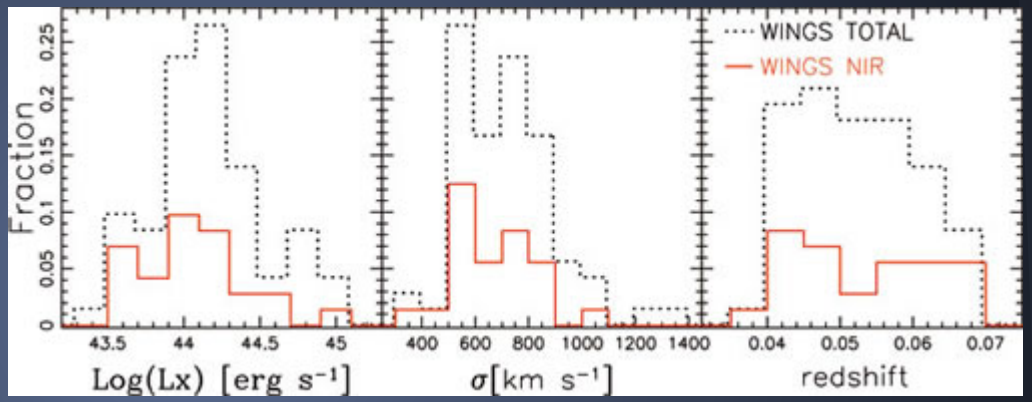
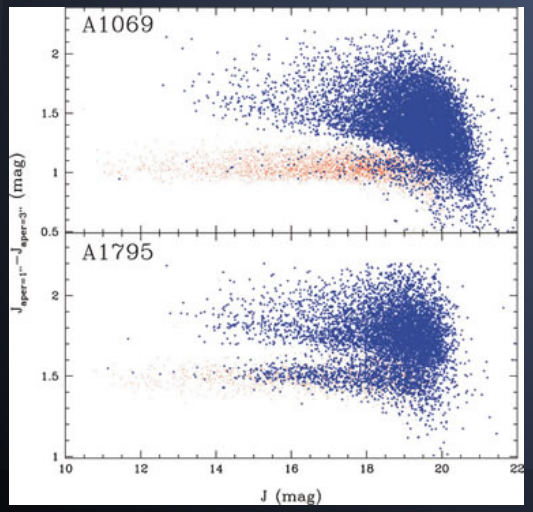
Vulcani et al., 2012

28 clusters (with good sampling of cluster properties)
pixel resolution ~ 0.2 Kpc
~750000 extended sources
90% detection completeness @ J=20.5, K=19.4
90% classification compl. @ J=19.5, K=18.5





Interactive cleaning of galaxy sample (to remove stars)

WINGS science
SED fitting

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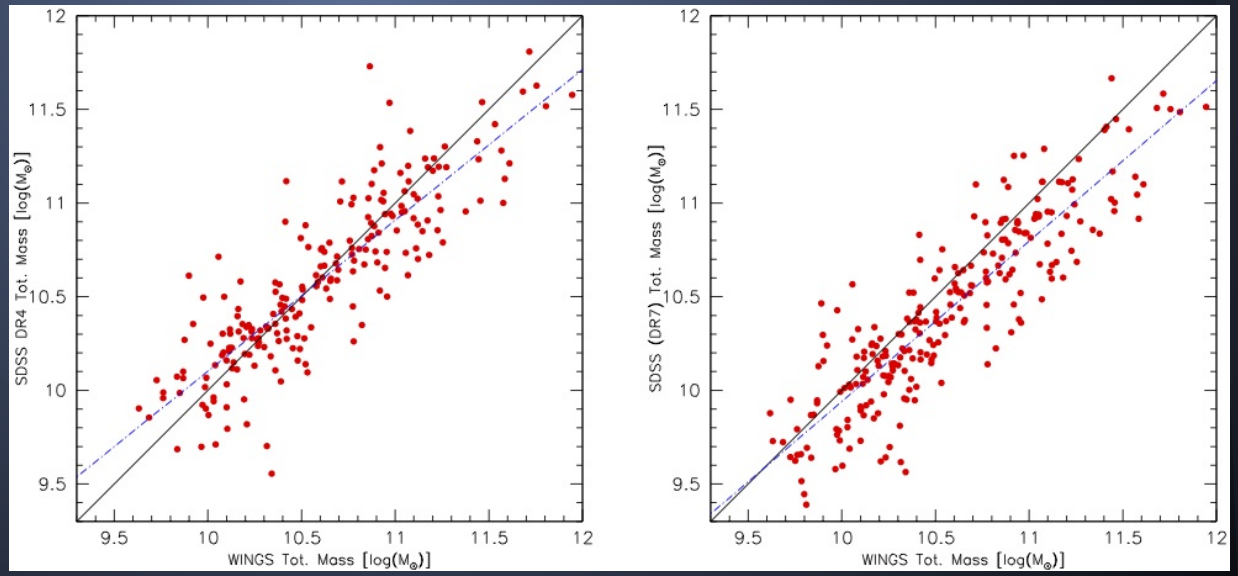
Vulcani et al., 2001b
D'Onofrio et al., 2011
Bettoni et al., 2011
Valentinuzzi et al., 2011
Fasano et al., 2012
Vulcani et al., 2012

SED fit on ~5300 galaxies
(12 ages, 3 metallicities)
70% with chi-sq <3.0

->Stellar masses

->Star Formation Histories

->Ages (MW & LW)



WINGS science

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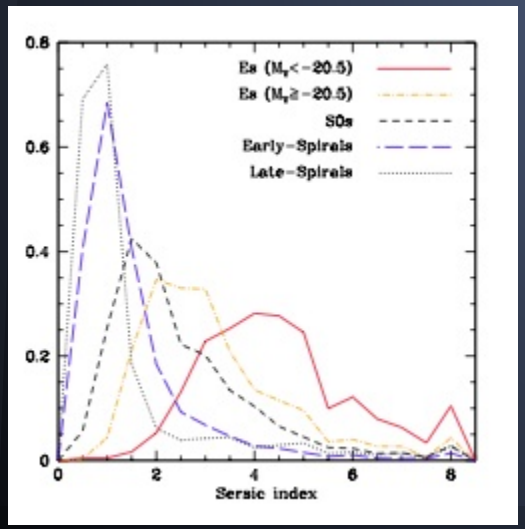
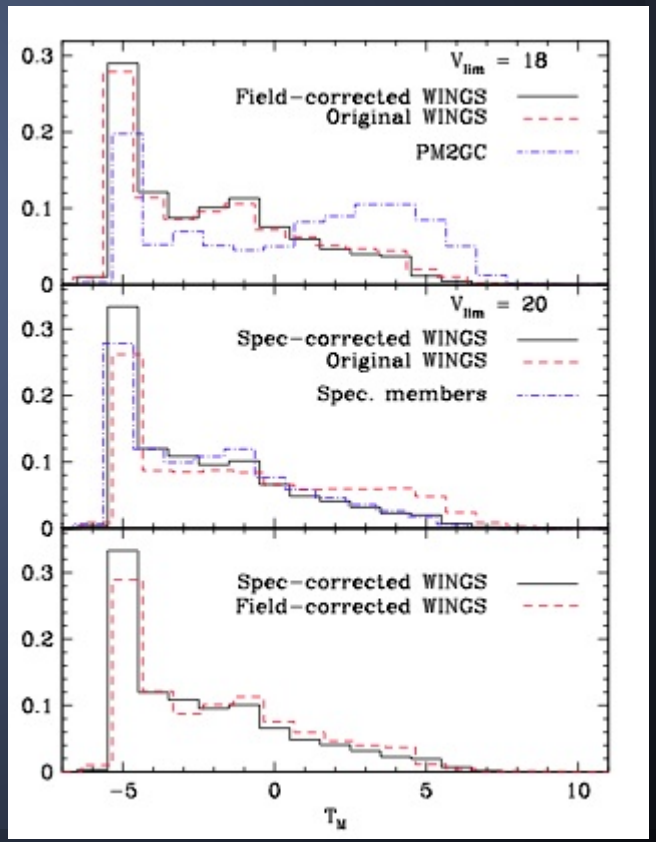
Fasano et al., 2012
Vulcani et al., 2012

MORPHOT: automatic classification of morphological types based on 21 diagnostics & ML + NN technique
Validation using ~ 1000 visually class. galaxies [particularly efficient in separating E and S0, unlike other automatic tools]

-> M type for ~ 40000 WINGS galaxies





WINGS WiP

Moretti et al. [LF]
Moretti et al. [Database]
Gullieuszik et al. [OmegaWINGS]
Omizzolo et al. [U,B]
Fasano et al. [Morph/Density]
Hanssen et al. [Lick indices]
Marziani et al. [AGN]
Bindoni et al. [Surf. photom.]

OmegaWINGS

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Motivations:

study outskirts of clusters and the infalling regions, where clusters accrete new galaxies.

morphologies, sizes, structural parameter in different vs. distance from the center

Data:

u', B- and V- band OmegaCAM imaging for all WINGS clusters observable from Paranal (59/76)

2 observing programs in GTO time (PI Poggianti [BV] and D'Onofrio [U]). 60+60 hrs

Observations started 1 year ago (ESO P88) [18 clusters already observed]

The two programs will be likely completed in ~1year (end of ESO P92)

Data-reduction:

ESO/MVM or "*Alambic*" + simple Python scripts.

Completed automated pipeline. From raw telescope frames to stacked mosaics

OmegaWINGS

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Photometric calibration:

CCDs gain variation: calculated from background value

Illumination correction: based on dithered observations of SA107

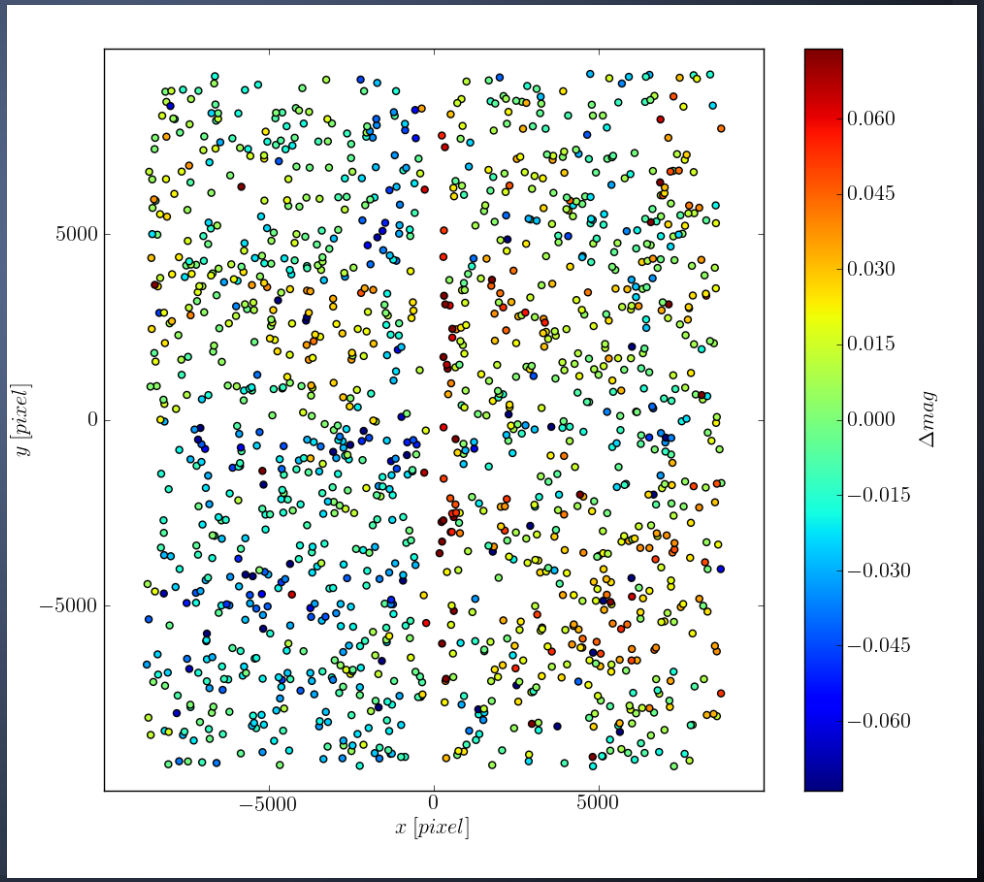
[up to 0.2 mag]

ZP and Colour terms:

by comparison with previous WINGS photometry

Astrometric calibration:

SDSS DR8 (when available) or 2MASS



SDSS DR8 -> Johnson (Jordi et al., 2005) [Entire field]

OmegaWINGS

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Moretti et al. [Database]
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Omizzolo et al. [U,B]
Fasano et al. [Morph/Density]
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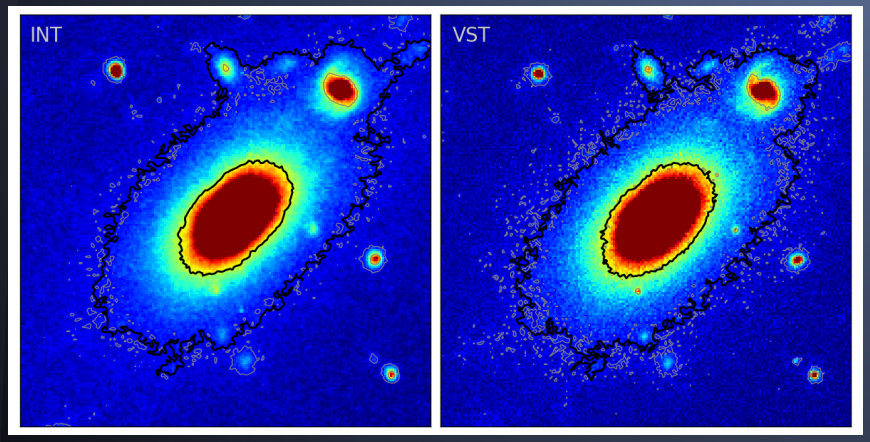
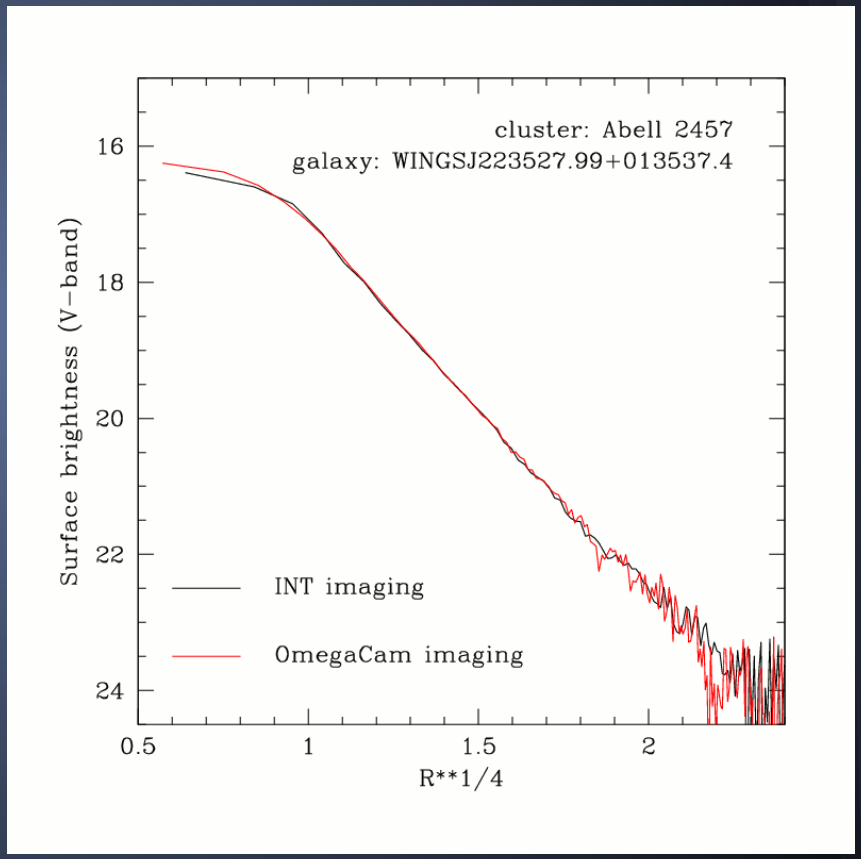
Sky subtraction

2step combination of dithered images

+ source masking





WINGS data (catalogs)

Optical photometry (~759000) and surface photometry (~42000)

NIR photometry (~960000 [k] ~630000[j]) and surface photometry (~72000 [k])

SFH (~5300)

Morphologies (~40000)

EW (~4400)

Local densities (~66000)

Lick indices (~4500)

The VO tools and WINGS

thanks to IA2 team in Trieste

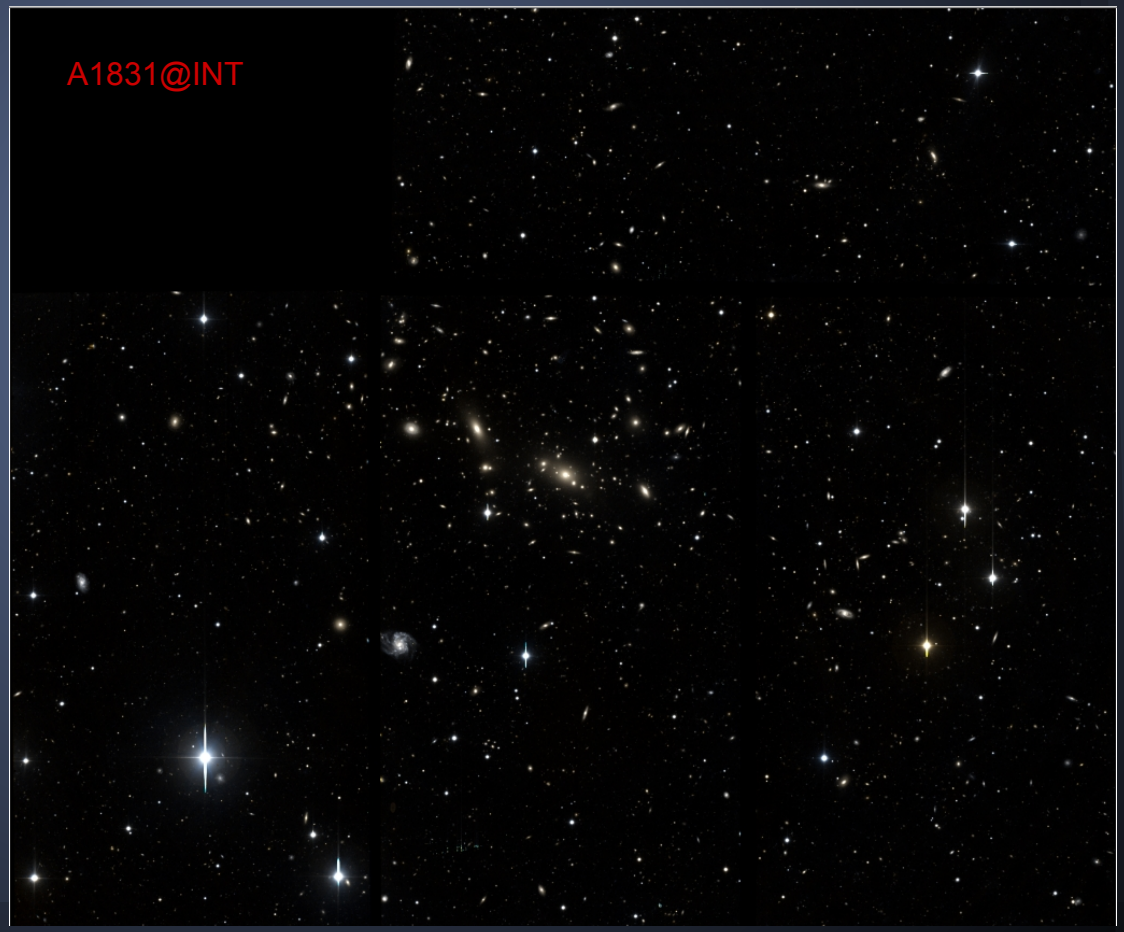
34'x34' B, V images for 76 custers available (Aladin, TOPCAT)

Mosaic
Fully calibrated (astro+photo)
Ready to download and use

Surface photometry (V, K) catalogs

Equivalent widths catalogs

Local densities catalogs [Unpublished yet]



The VO tools and WINGS: how to

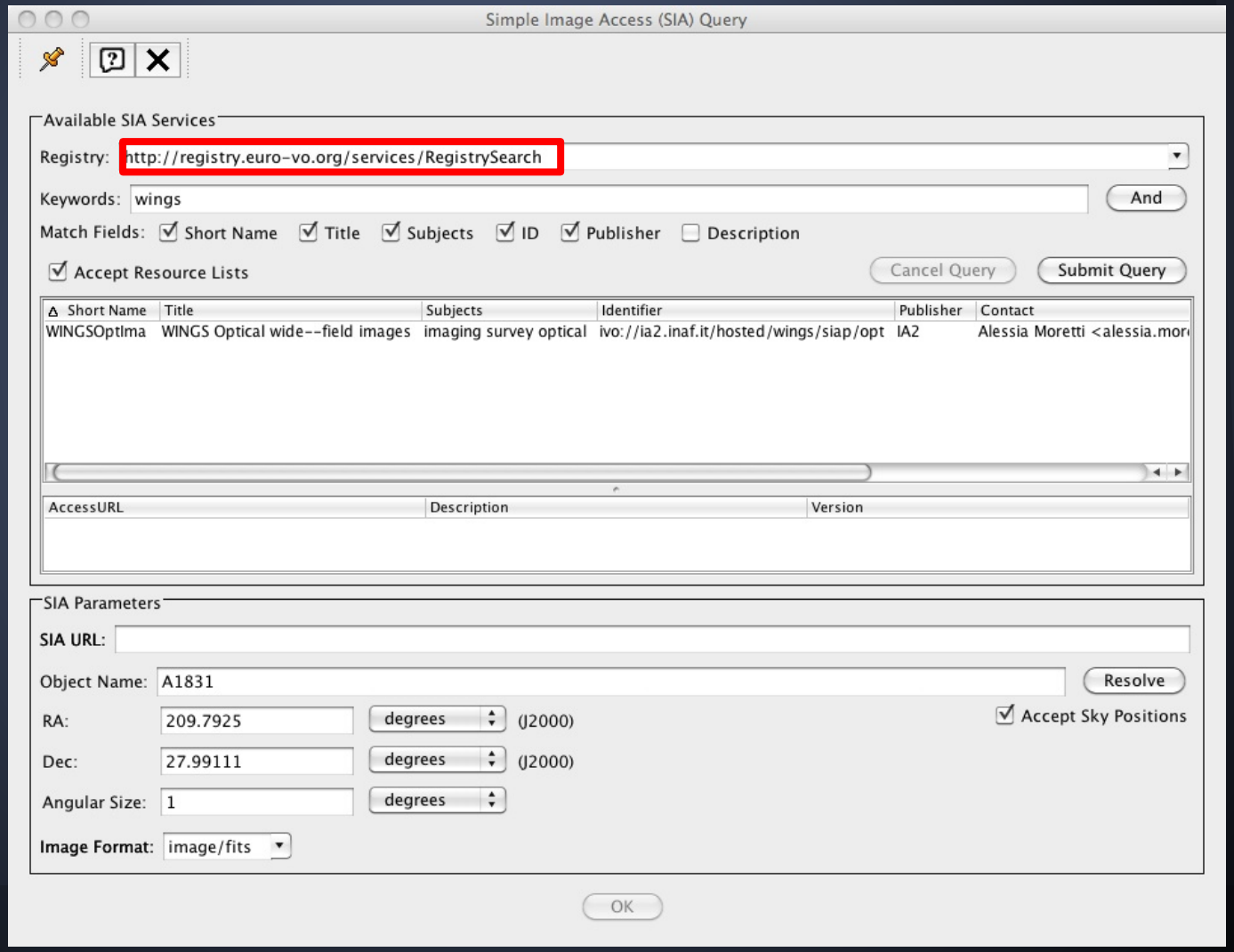
SIA query

Registry: euro-vo

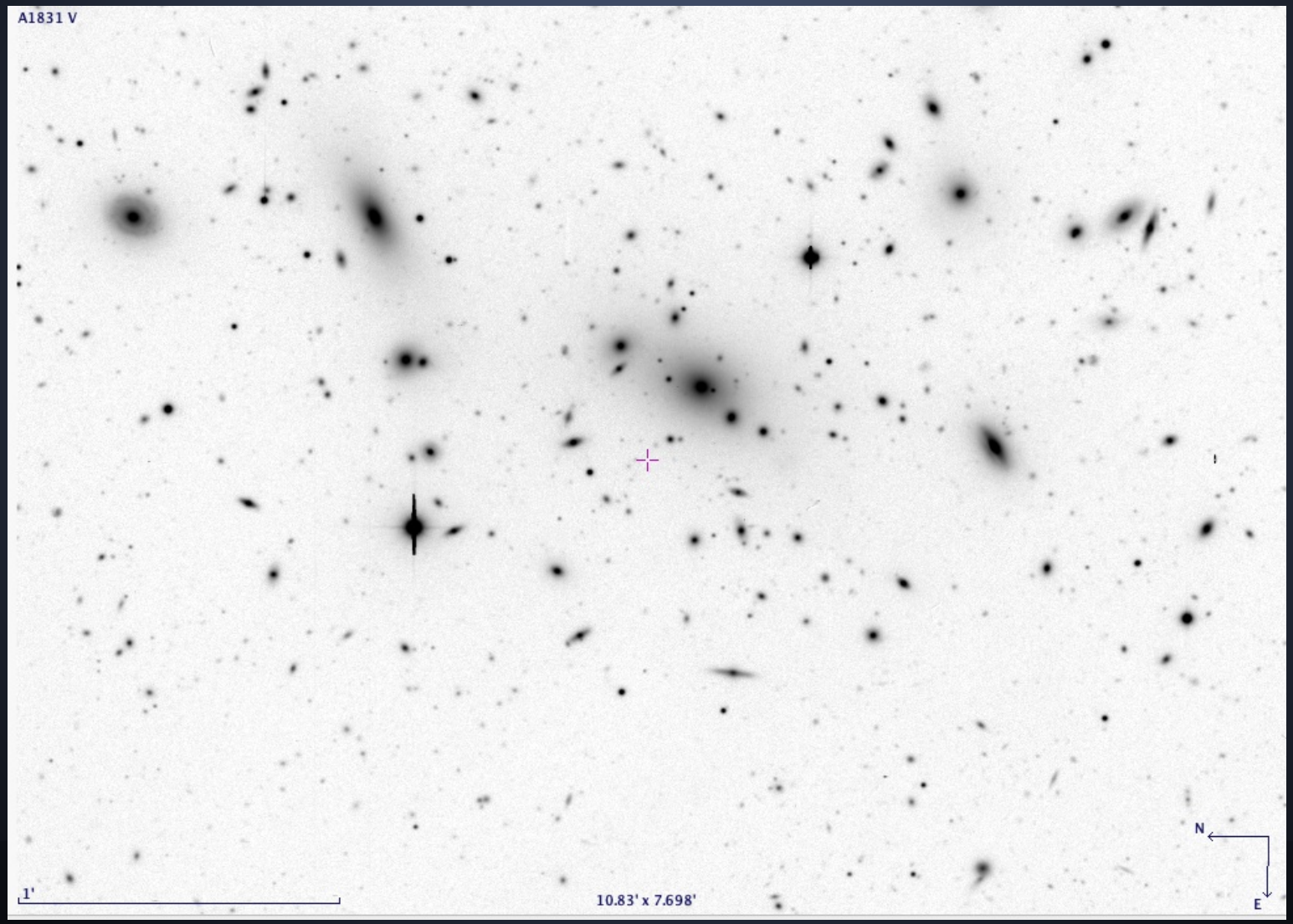
Keyword: WINGS

SIA parameters: Optional

Send table to Aladin



The VO tools and WINGS: how to



The VO tools and WINGS: how to

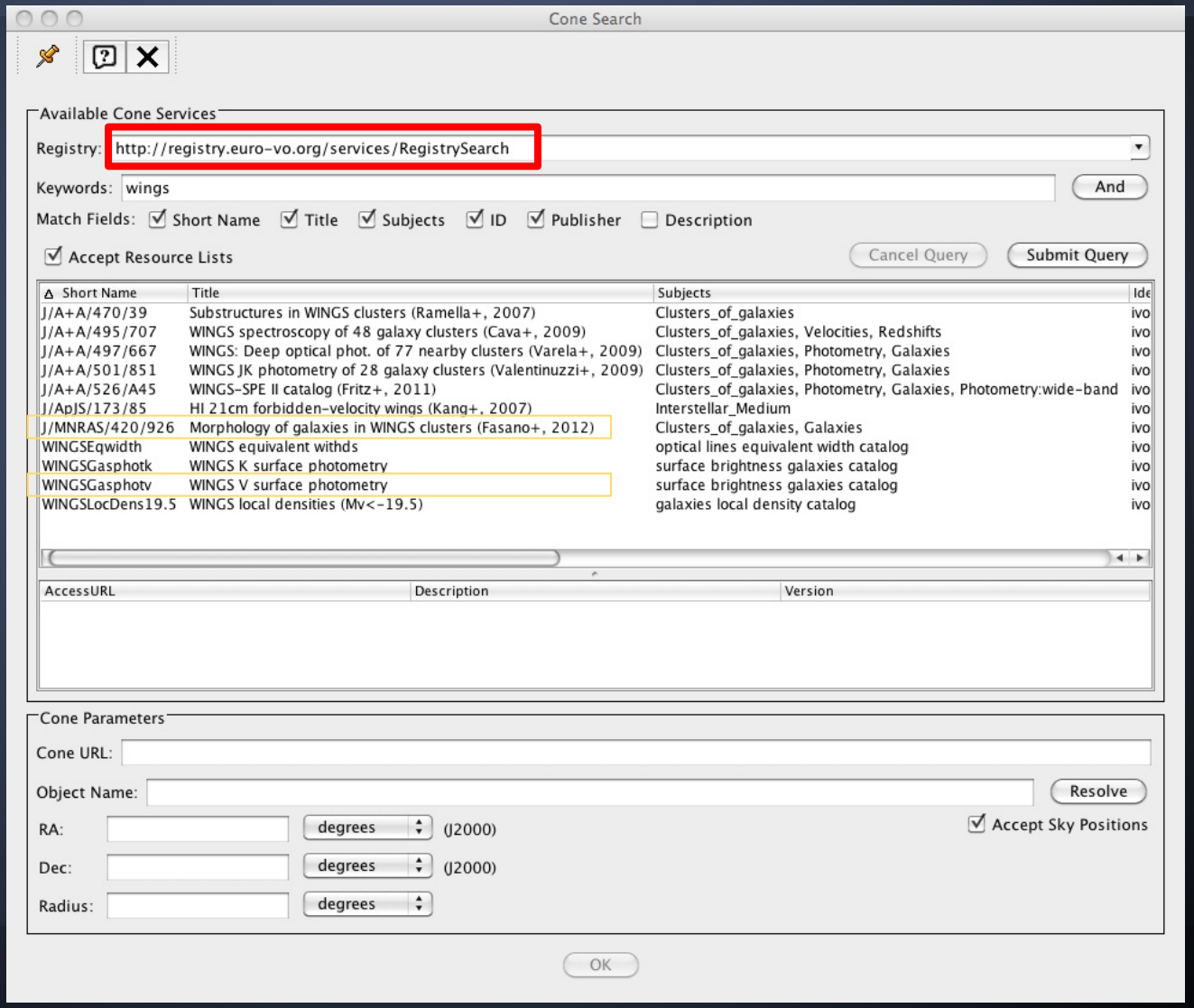
Cone search

Registry: euro-vo

Keyword: WINGS

cone parameters: Optional

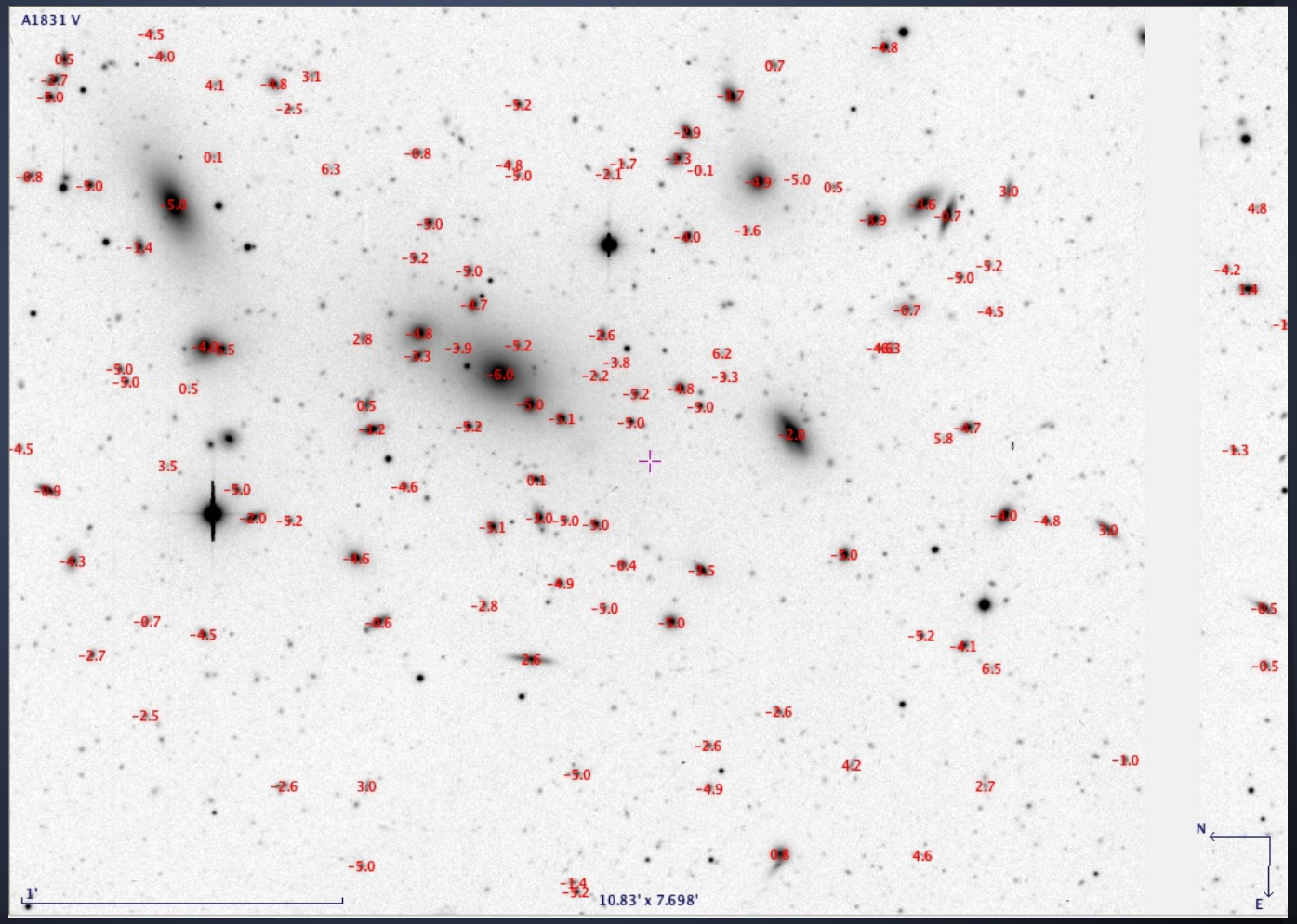
Send table to Aladin



The VO tools and WINGS: how to

Morphologies:

derived by MORPHOT (and visual, if any)
+ errors



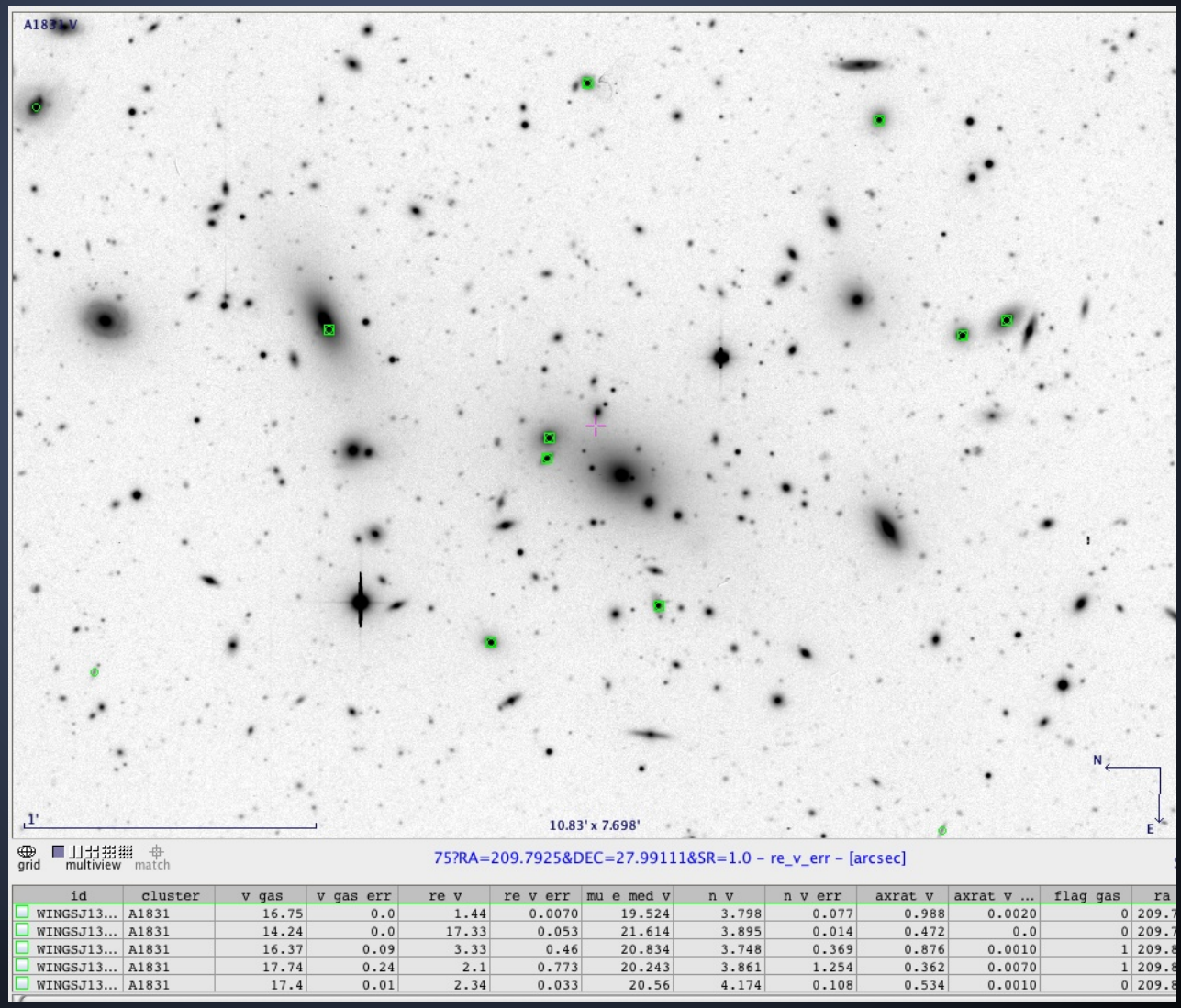
The VO tools and WINGS: how to

Gasphot catalog (V, K)

-> Surf. brightness

-> Sersic index

-> Axial ratio



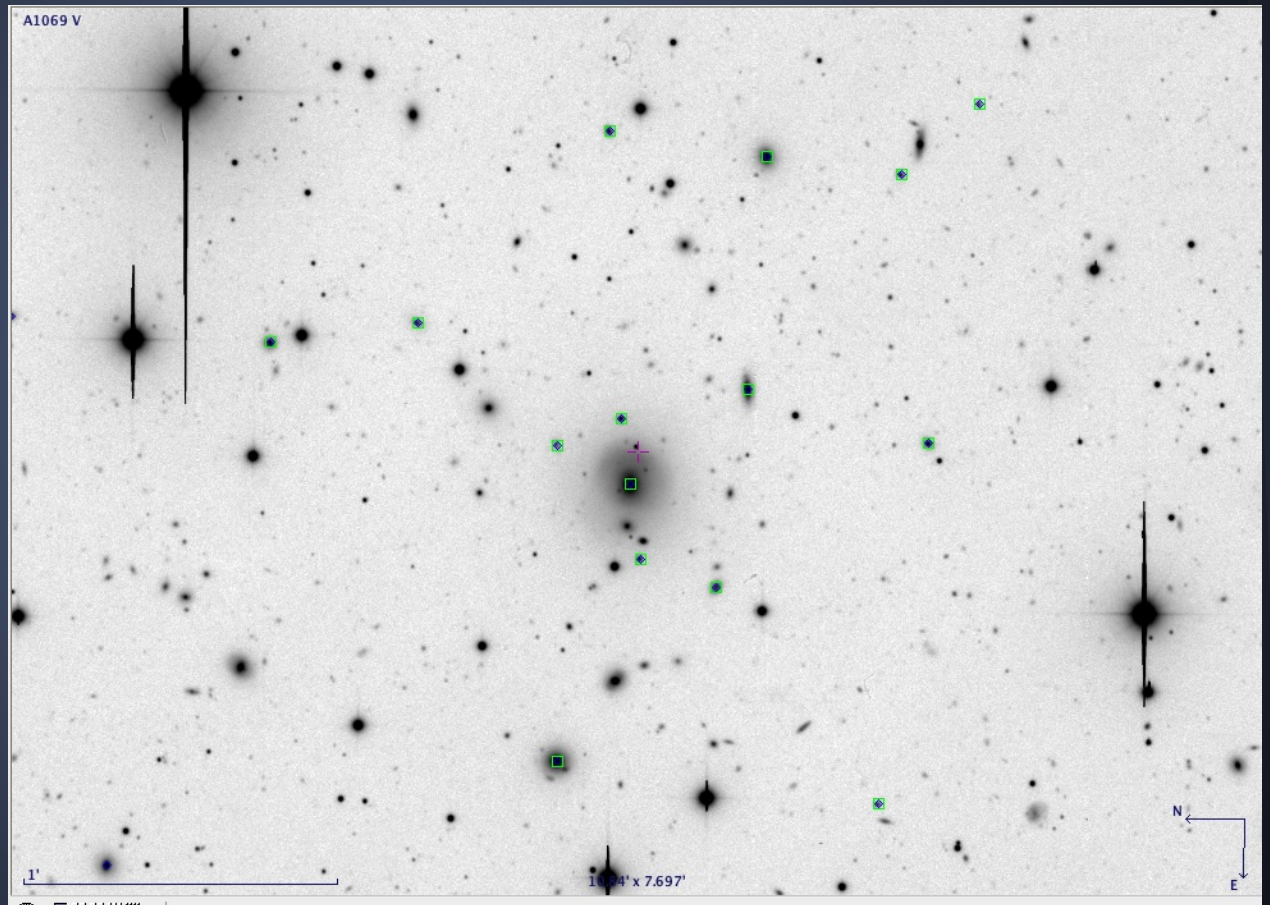
id	cluster	v gas	v gas err	re v	re v err	mu e med v	n v	n v err	axrat v	axrat v ...	flag gas	ra
WINGSJ13...	A1831	16.75	0.0	1.44	0.0070	19.524	3.798	0.077	0.988	0.0020	0	209.7
WINGSJ13...	A1831	14.24	0.0	17.33	0.053	21.614	3.895	0.014	0.472	0.0	0	209.7
WINGSJ13...	A1831	16.37	0.09	3.33	0.46	20.834	3.748	0.369	0.876	0.0010	1	209.8
WINGSJ13...	A1831	17.74	0.24	2.1	0.773	20.243	3.861	1.254	0.362	0.0070	1	209.8
WINGSJ13...	A1831	17.4	0.01	2.34	0.033	20.56	4.174	0.108	0.534	0.0010	0	209.8

The VO tools and WINGS: how to

Eqwidth catalog:

-> emission and absorption lines

-> spectral type [1=e(a); 2=e(b); 3=e(c); 4=k; 5=k+a; 6=a+k]



ID	ra bar	dec bar	OII	OII ERROR	HTHETA	HTHETA E...	HETA	HETA ERROR	HZETA	HZETA ER...	CAK	CAK
WINGSJ10...	159.925354	-8.6760902	-73.227	27.121	1.667	0.929	99.0	99.0	-1.918	1.367	9.328	
WINGSJ10...	159.9308...	-8.686697	0.0	0.01	2.085	1.771	4.928	1.589	0.976	0.536	7.046	
WINGSJ10...	159.9417...	-8.6882877	99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0	2.777	
WINGSJ10...	159.945755	-8.6993494	0.0	0.323	99.0	99.0	2.341	1.265	99.0	99.0	4.744	
WINGSJ10...	159.9714...	-8.6767387	0.0	0.353	99.0	99.0	4.769	1.832	99.0	99.0	6.987	

Concluding remarks: USE WINGS!