Low X-Ray Galaxy Clusters

and its implication in the galaxy morphology evolution

J. L. Nilo Castellón

In this Talk

Collaborators

The Basis : Why these clusters??

Our Data

Some Results

Future

Collaborators

Córdoba Team

María Victoria Alonso (dir)
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DGL

OAC

La Serena Team

Héctor Cuevas (dir)
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·Felipe Ramos

Departamento Física
Universidad de La Serena
Chile

Random team!! (La Serena, Sao Paulo, Hawaii...who knows!)

Rodrigo Carrasco

GEMINI OBSERVATORY

Why these clusters??

→ Poggianti et al. 2009 : WINGS survey & EDicCS Survey

"*We find that the spiral and S0 fractions have evolved more strongly in lower σ, less massive clusters, while we confirm that the proportion of ellipticals has remained unchanged*"

→ Dressler et al. 2009 : SDSS and SWIRE

" *We suggest that the change in both the rate and mode of star formation could results from the strong decrease since z= 1 of gas available for star formation*"

→ Holden et al. 2009 :

" *… we conclude from the lack of evolution in the observed early-type ellipticity distribution that the relative fractions of elliptical and S0's do not evolved from z~1 to z~0 for a red-sequence selected samples of galaxies in the cores of clusters of galaxies.*"

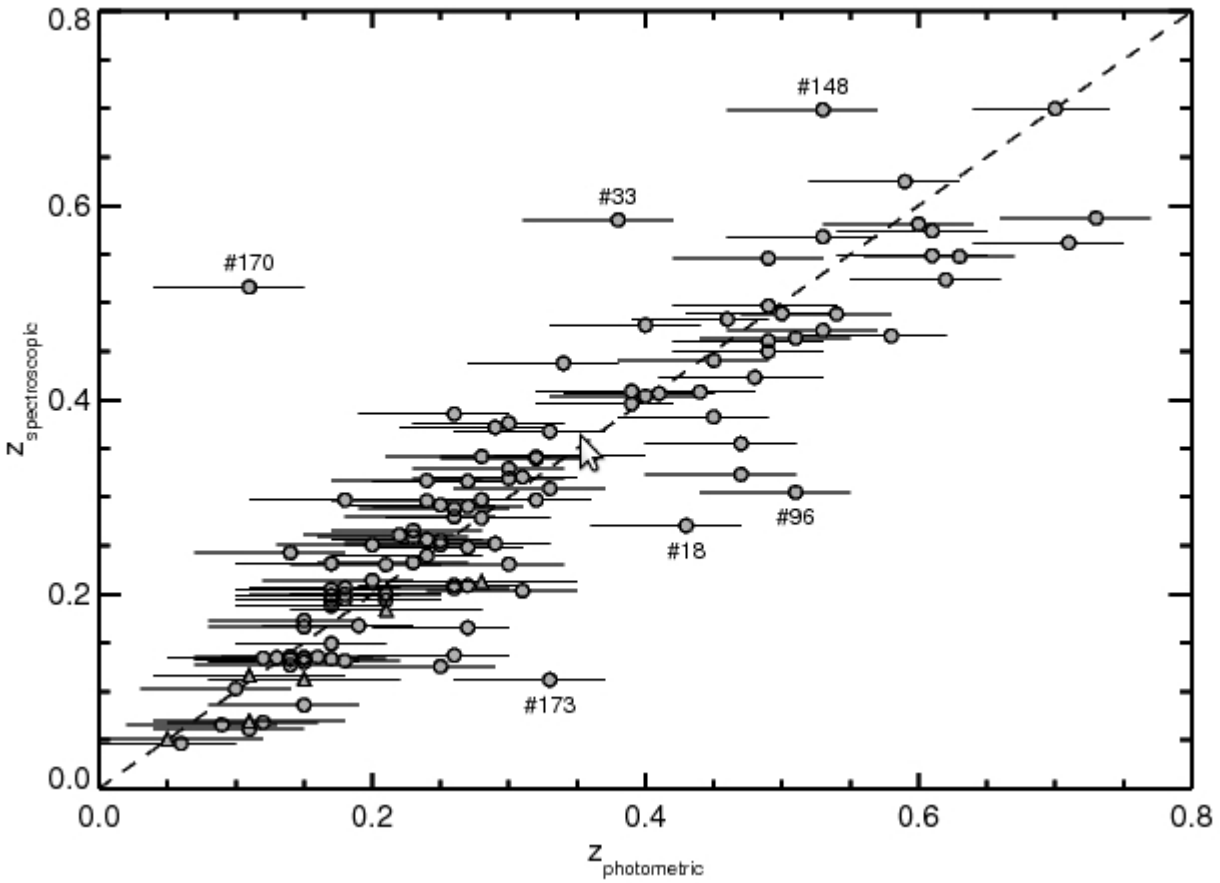
1. The Sample

Vikhlinin et al 199

→ 160 Square Deg
→ X-ray 2x10^{42} [
to 10^{43} [erg/s]int
clusters)
→ 223 X-Ray sou
→ 200 clusters
→ 73 z_{spec} and 1
→ 0.015 < z < 0.7

Mullis et al. 2003

→ 200 z_{spec} : 19 FD & 1
→ 0.015 < z < 0.700 + 1,261!!



IN THE *ROSAT* PSPC

2138;

tiago, Chile

nmark

T PSPC high Galactic lat-
uster samples, comparable
). We detect clusters in the
ission. Fluxes of detected
. X-ray luminosities range
ding to rich clusters. The
dii, spectroscopic redshifts
mized for finding extended
necessary for a statistical
s.
remaining 23 sources, 18
or 5 we have not obtained
ces are optically confirmed
ent agreement with counts
ry et al. 1992) and *ROSAT*
rees with the smaller-area
higher than those from a
, we find a surface density

G OF 201 CLUSTERS

RY[3], I.M. GIOIA[7,3],

ABSTRACT

We present the revised catalog of galaxy clusters detected as extended X-ray sources in the 160 Square Degree *ROSAT* Survey, including spectroscopic redshifts and X-ray luminosities for 200 of the 201 members. The median redshift is $z_{\rm median} = 0.25$ and the median X-ray luminosity is $L_{\rm X,median} = 4.2\times10^{43}$ h_{50}^{-2} erg s^{-1} (0.5–2.0 keV). This is the largest high-redshift sample of X-ray selected clusters published to date. There are 73 objects at $z > 0.3$ and 22 objects at $z > 0.5$ drawn from a statistically complete flux-limited survey with a median object flux of 1.4×10^{-13} erg cm^{-2} s^{-1}. We describe the optical follow-up of these clusters with an emphasis on our spectroscopy which has yielded 155 cluster redshifts, 110 of which are presented here for the first time. These measurements combined with 45 from the literature and other sources provide near-complete spectroscopic coverage for our survey. We discuss the final optical identifications for the extended X-ray sources in the survey region and compare our results to similar X-ray cluster searches.

Subject headings: catalogs — galaxies: clusters: general — surveys — X-rays: galaxies

Mmmm.....but exist previous works????

Mon. Not. R. Astron. Soc. **000**, 000–000 (0000) Printed 11 April 2011 (MN LATEX style file v2.2)

Galaxy Properties in Low X-Ray Luminosity Clusters at z=0.25

Michael Balogh[1,2], R. G. Bower[1,4], Ian Smail[1], B. L. Ziegler[3,4], Roger L. Davies[1], A. Gaztelu[1], Alexander Fritz[3]
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[2] *email: M.L.Balogh@Durham.ac.uk*
[3] *Universitaetssternwarte, Geismarlandstr. 11, 37083 Goettingen, Germany*
[4] *Visiting astronomer of the German–Spanish Astronomical Center, Calar Alto, operated by the Max–Planck–Institut für Astronomie, Heidelberg, jointly with the Spanish National Commission for Astronomy.*

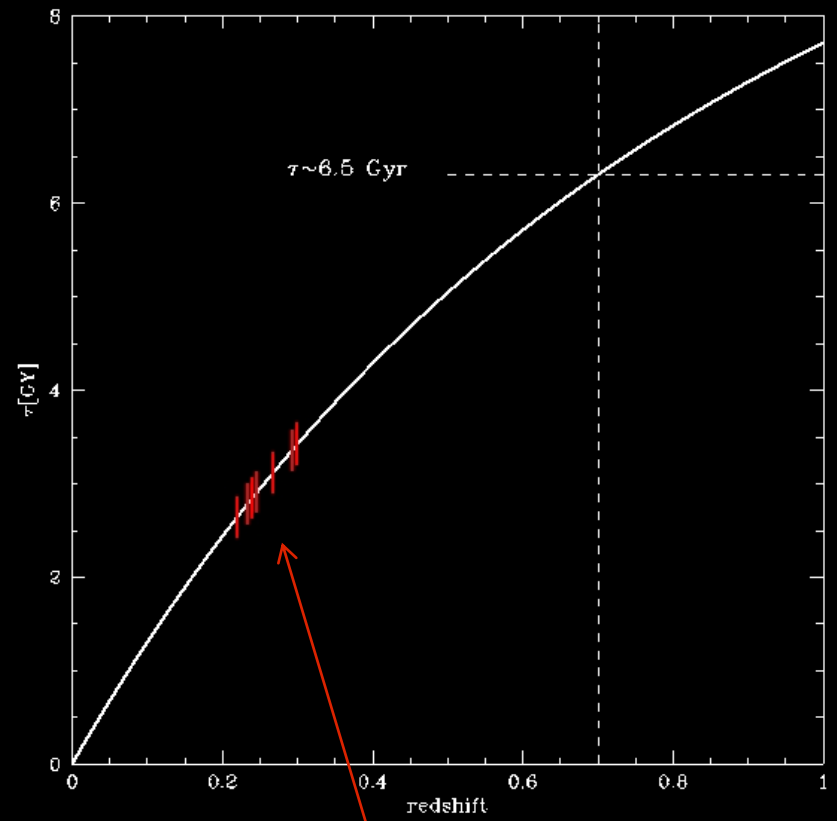


Table 1. PROPERTIES OF THE TEN CLUSTERS

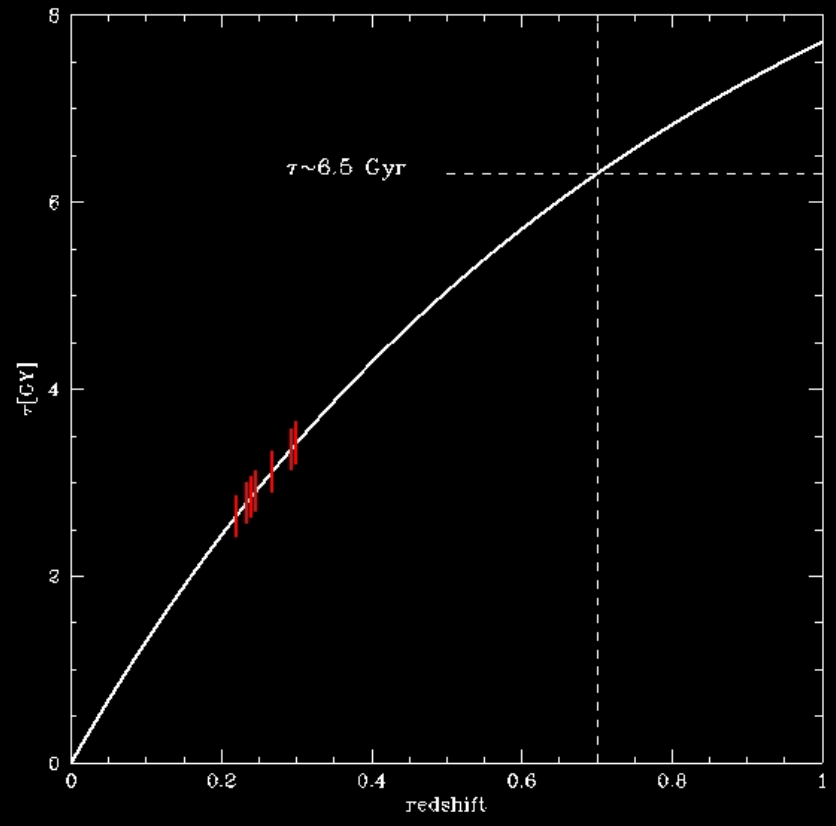
Name	R.A. (J2000)	Dec. (J2000)	N_{memb}	$< z >$	σ (km/s)	L_X (0.1–2.4 keV) $10^{43}h^{-2}$ ergs s^{-1}	Completeness[a]
Cl 0818+56	08 19 04	+56 54 49	9	0.2670	651±165	1.50	0.66
Cl 0819+70	08 19 18	+70 55 48	23	0.2296	356±39	1.26	0.88
Cl 0841+70	08 41 44	+70 46 53	21	0.2397	399±170	1.22	0.52
Cl 0849+37	08 49 11	+37 31 09	26	0.2343	764±90	1.93	0.69
Cl 1309+32	13 09 56	+32 22 14	19	0.2932	662±1304	2.01	0.41
Cl 1444+63a	14 43 55	+63 45 35	13	0.2923	403±73	3.99[b]	0.49
Cl 1444+63b	14 44 07	+63 44 59	15	0.3006	449±681	3.99[b]	0.49
Cl 1633+57	16 33 42	+57 14 12	18	0.2402	582±360	0.49	0.87
Cl 1701+64	17 01 47	+64 20 57	12	0.2458	834±647	0.40	0.52
Cl 1702+64	17 02 14	+64 19 53	15	0.2233	386±426	0.74	0.52

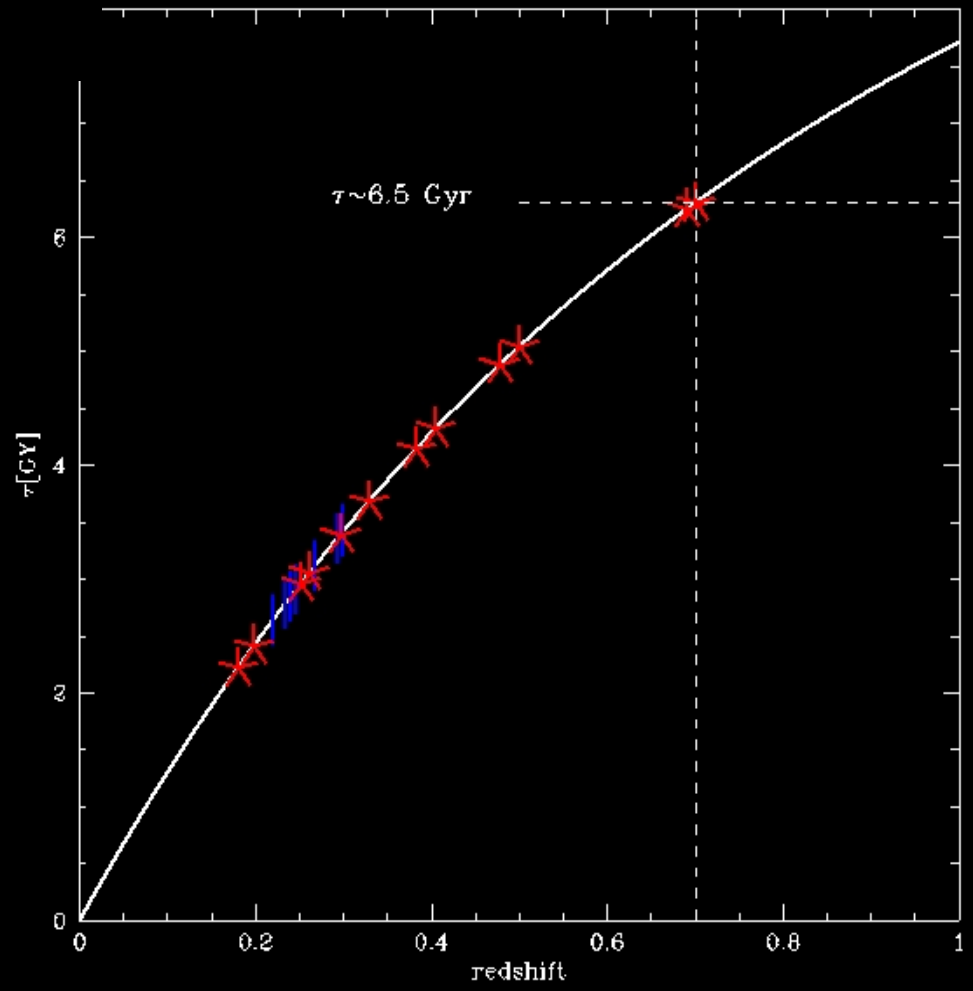
[a] Computed for galaxies more than 1 magnitude brighter than the faintest galaxy with a redshift in that cluster.
[b] Cl 1444+63 is only detected as a single X-ray source; this L_X presumably includes contribution from both clusters.

+ 30 spec

[VMF98]046 B, V, R, I	0.198	CTIO + MOSAIC II	
[VMF98]022 *r′*, *i′*	0.248 + 52 spec	GEMINI-S + GMOS	
[VMF98]113 B, V, R, I	0.261	CTIO + MOSAIC II	
[VMF98]045 B, V, R, I	0.297	CTIO + MOSAIC II	
[VMF98]085 *r′*, *i′*	0.329	GEMINI-N + GMOS	
[VMF98]089	0.383	GEMINI-N + GMOS	*r′*, *i′*
[VMF98]102 *r′*, *i′*	0.401 + 40 spec	GEMINI-S + GMOS	
[VMF98]097 *g′*, *r′*	0.487 + 70 spec	GEMINI-N + GMOS	
[VMF98]001 *r′*, *i′*	0.500	GEMINI-N + GMOS	

And after 6 Proposals and 4 PIT + 4 OT and hours and hours of data reduction !!!!





Total Images : 287 Ks
Total spectra : 25 Ks

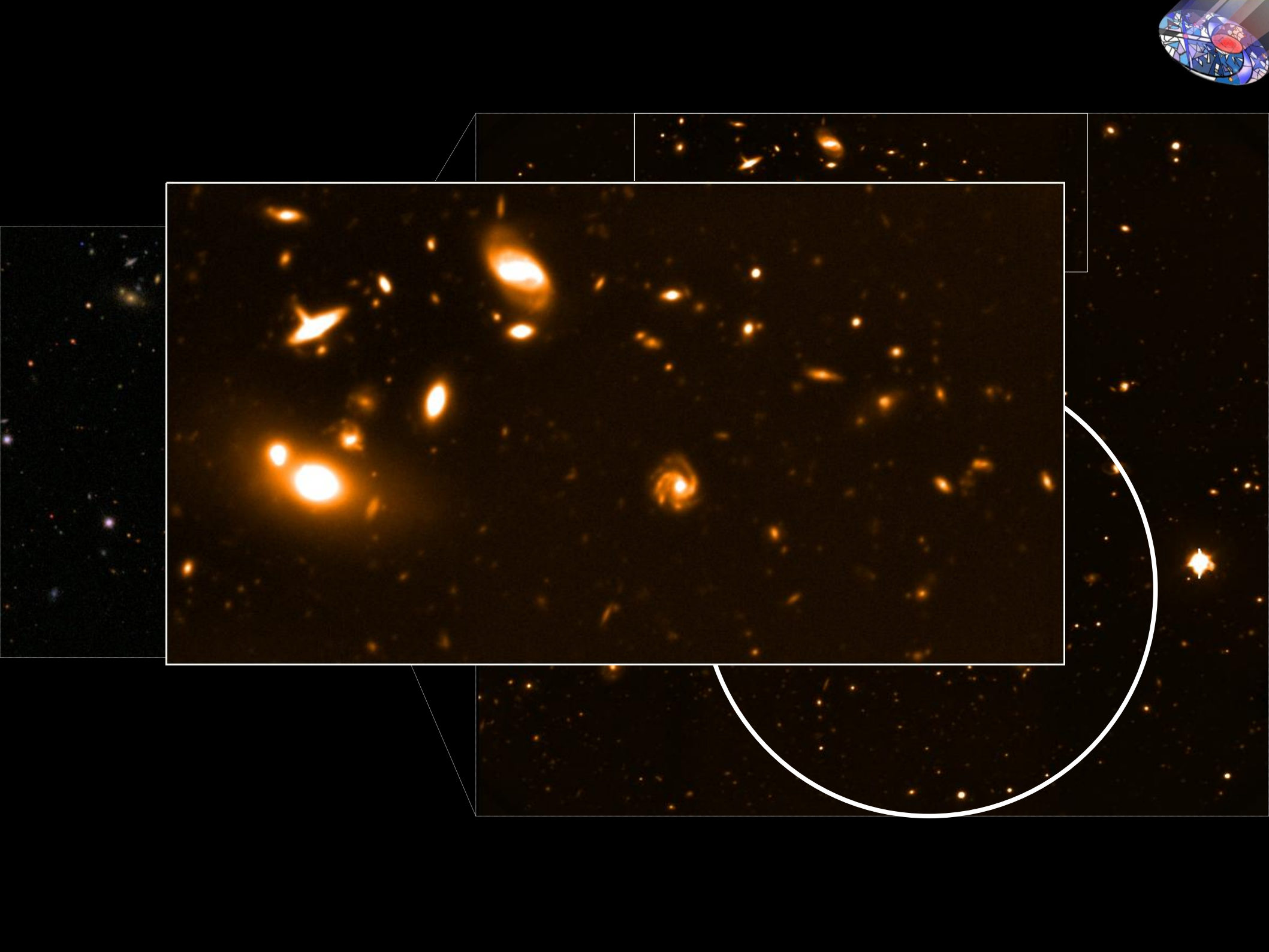
30% images + spec

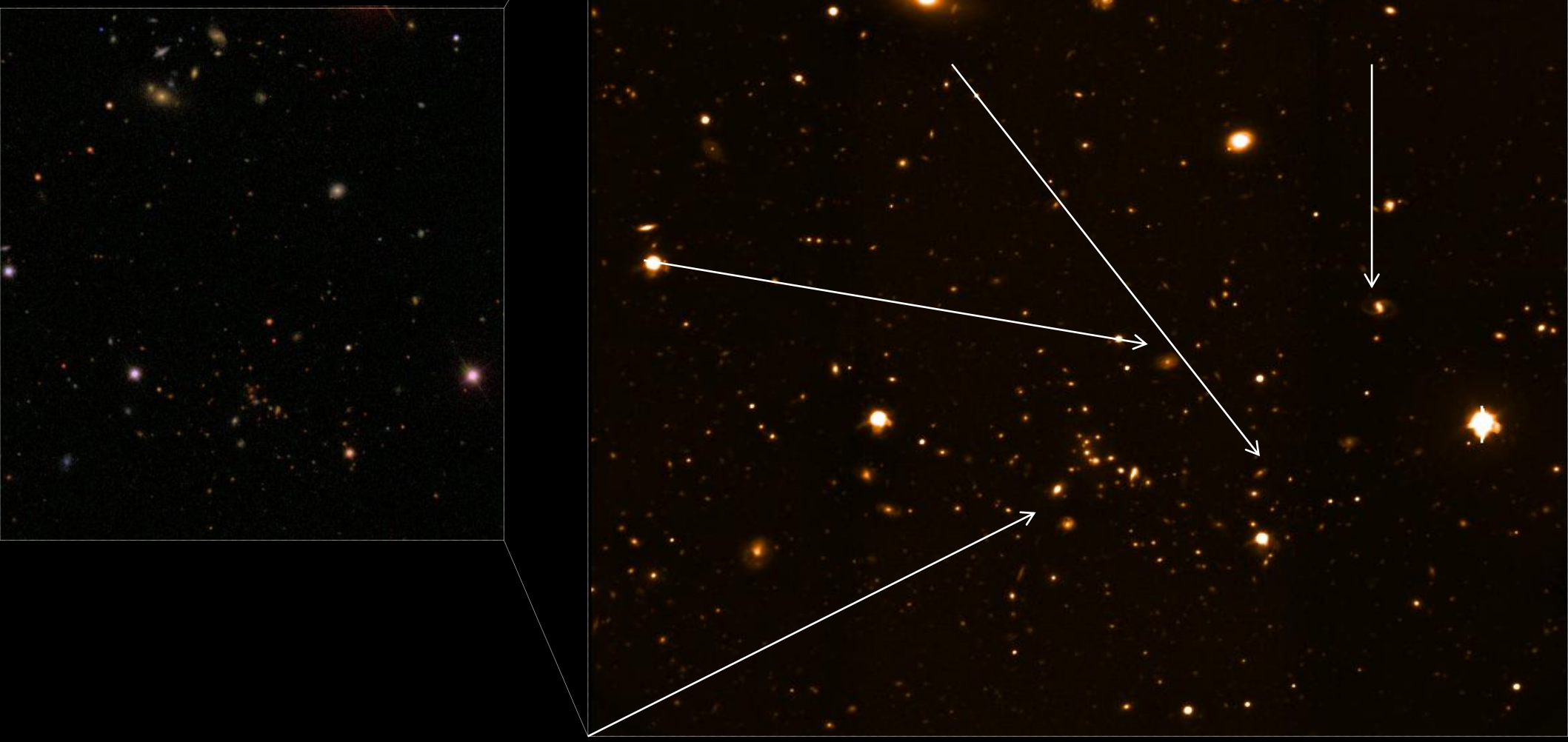
70% images

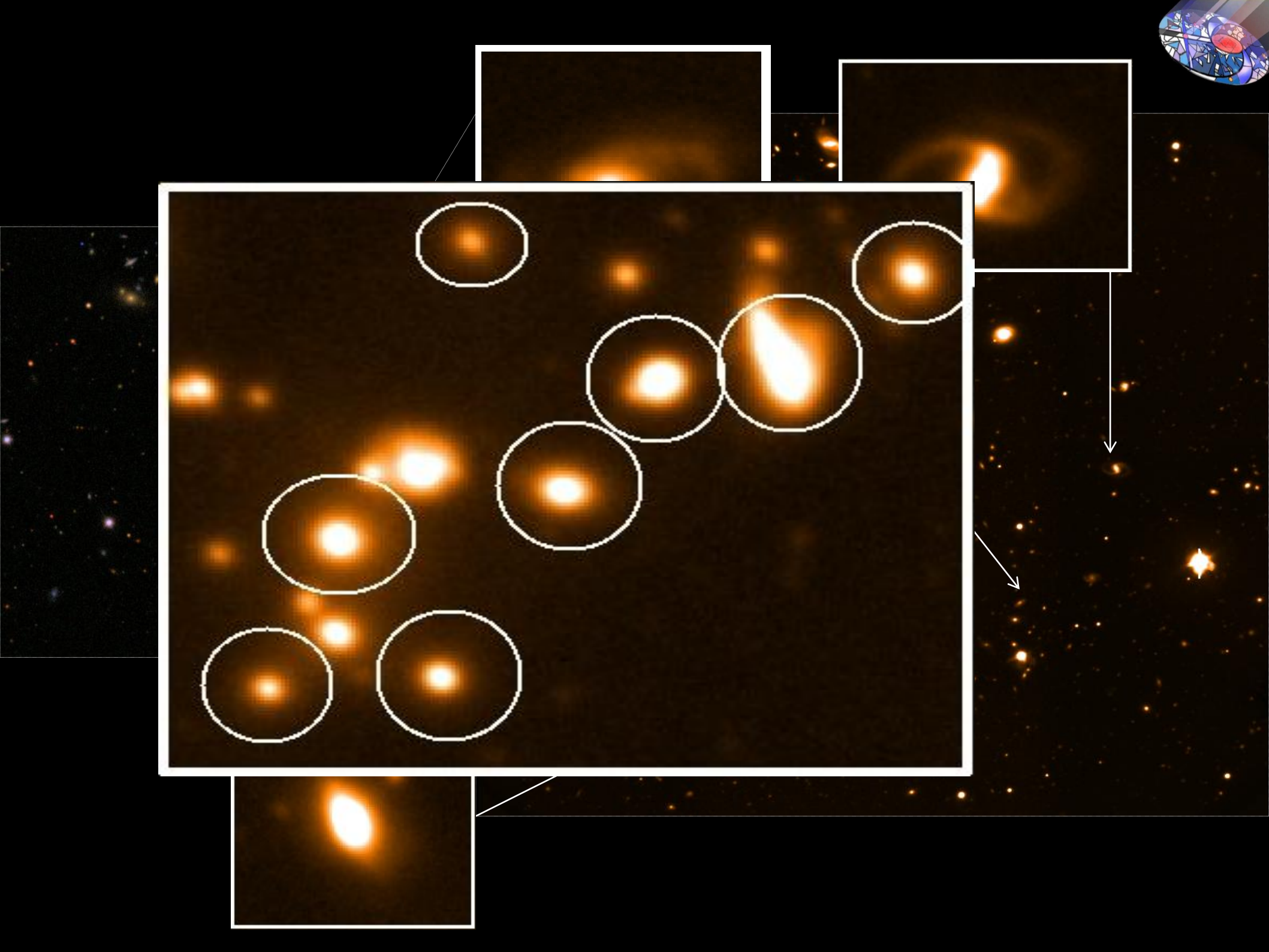
An example

RXJ11117.4+0743 or [VMF98]097

A.R. : 11 17 26,1 DEC : +07 43 35
$L_x = 4.4 \times 10^{43}$ erg/s
$Z_{media} \sim 0.485$





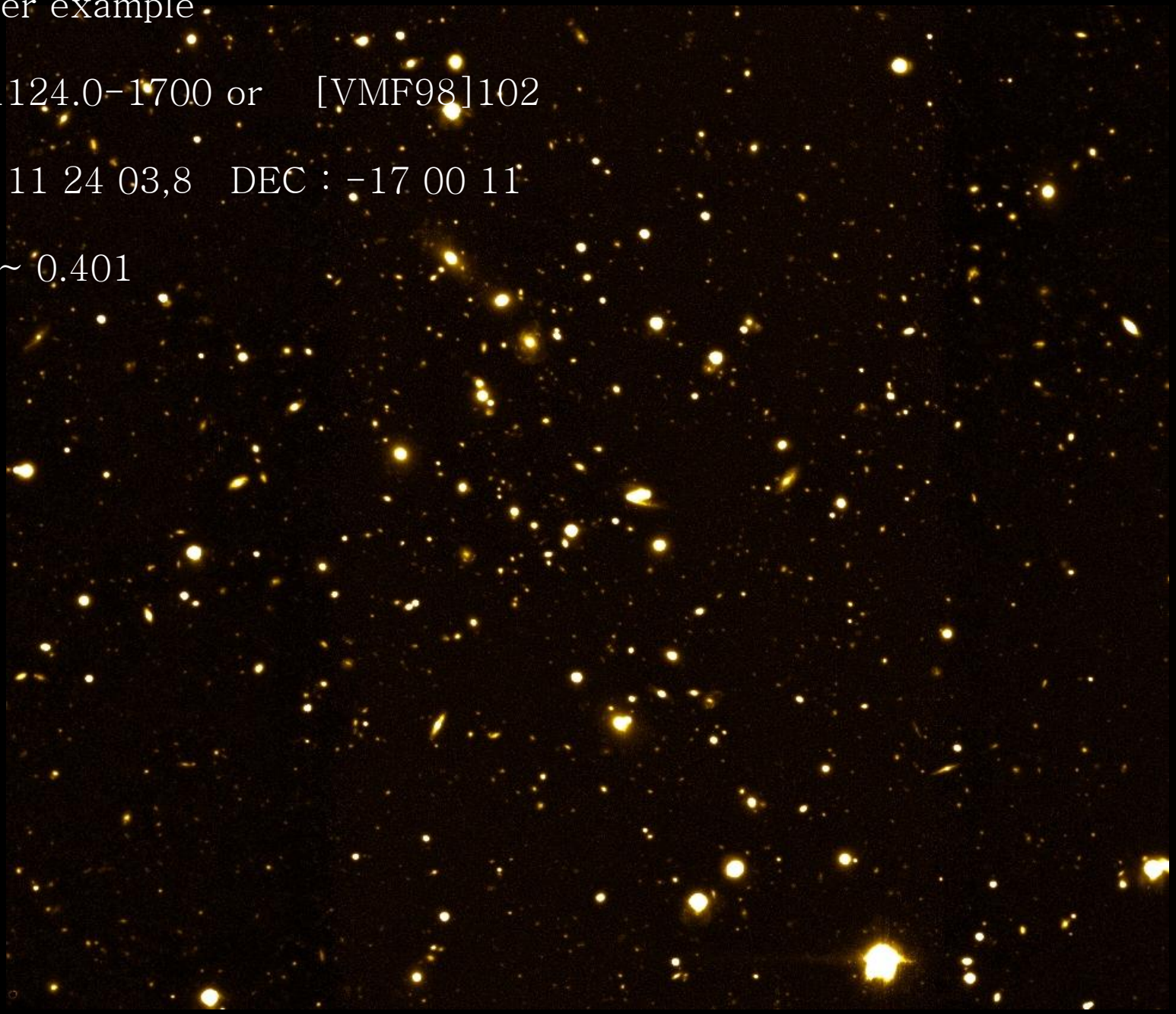


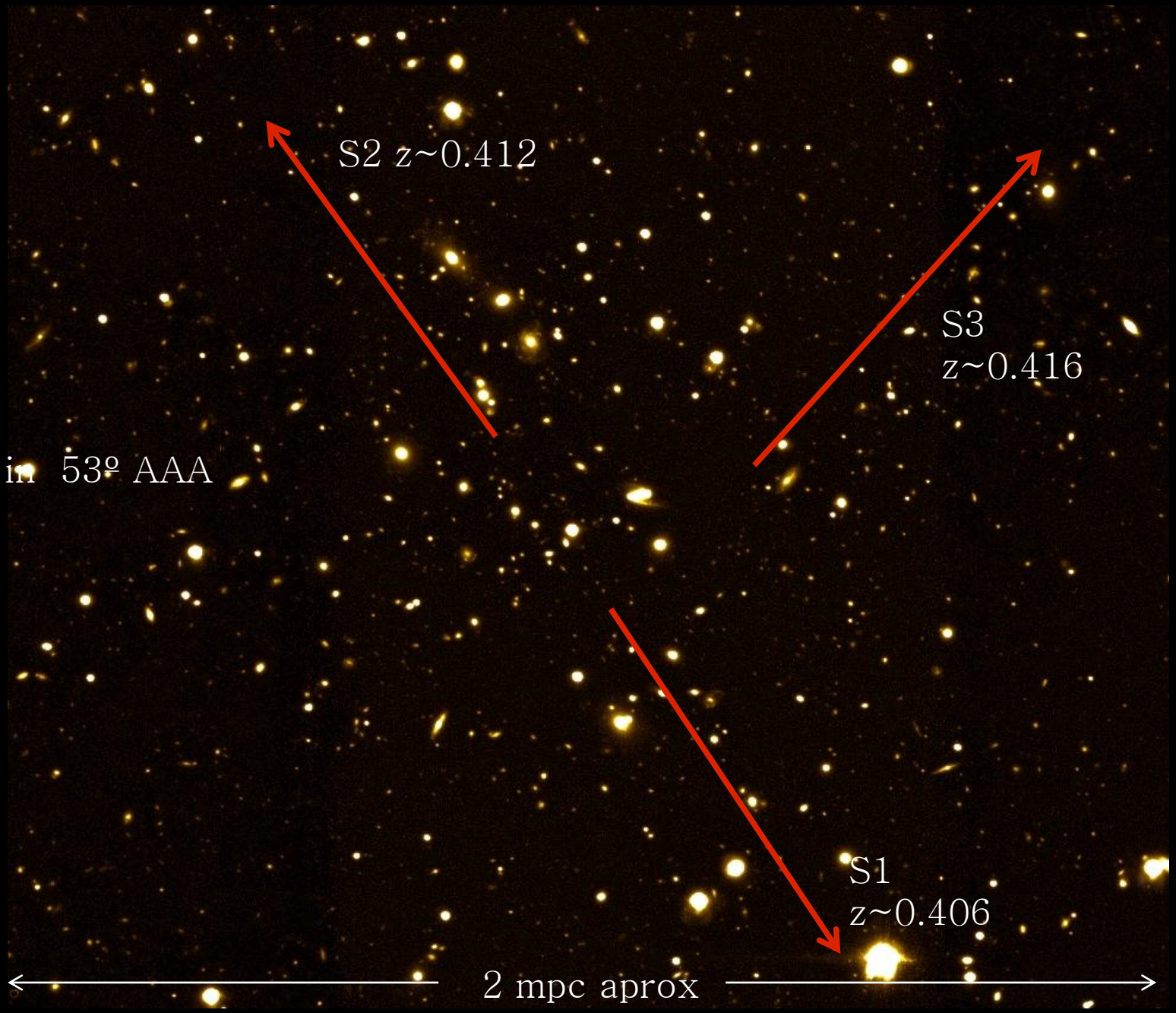
Another example

RXJ11124.0-1700 or [VMF98]102

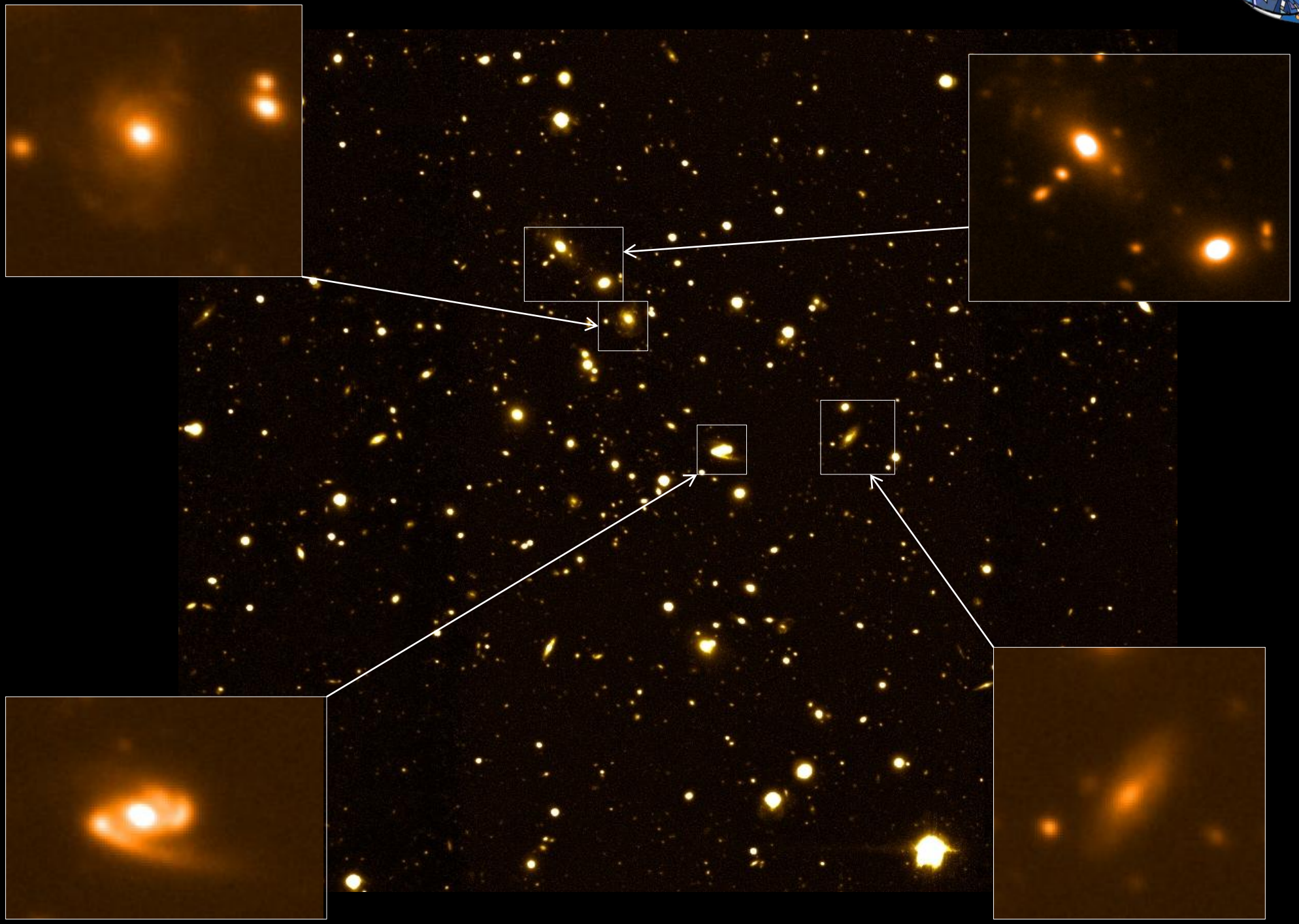
A.R. : 11 24 03,8 DEC : -17 00 11

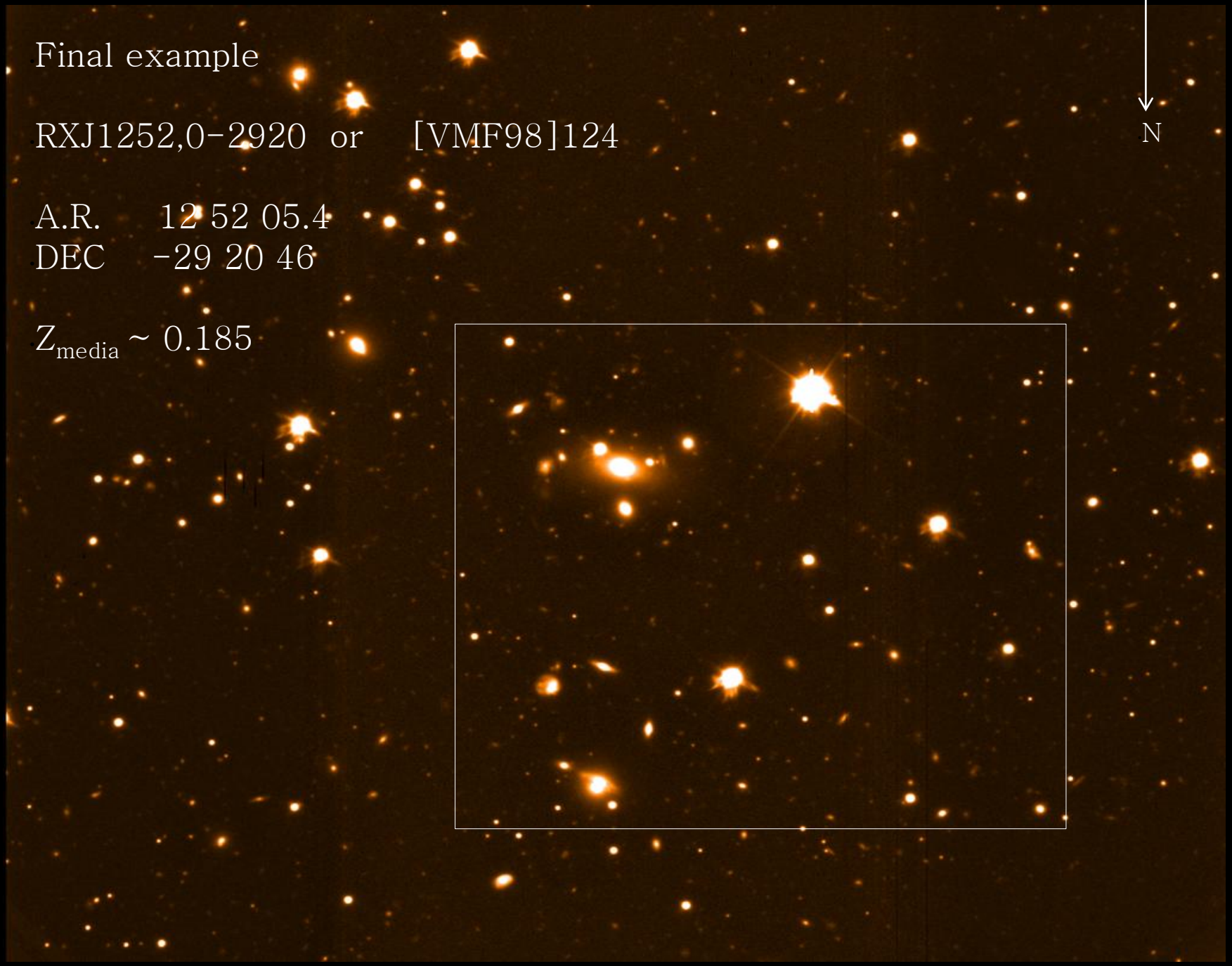
Z_{media} ~ 0.401

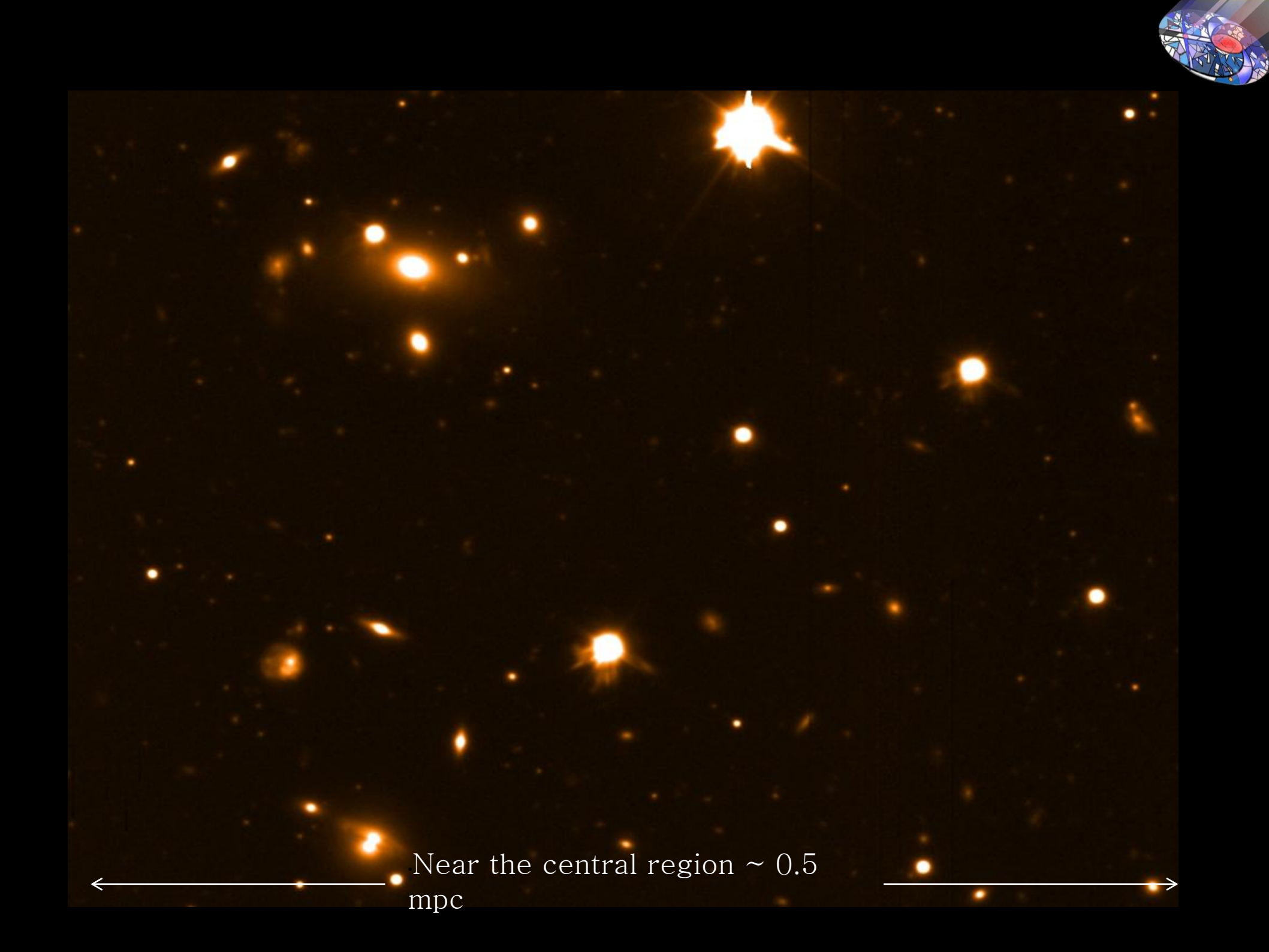


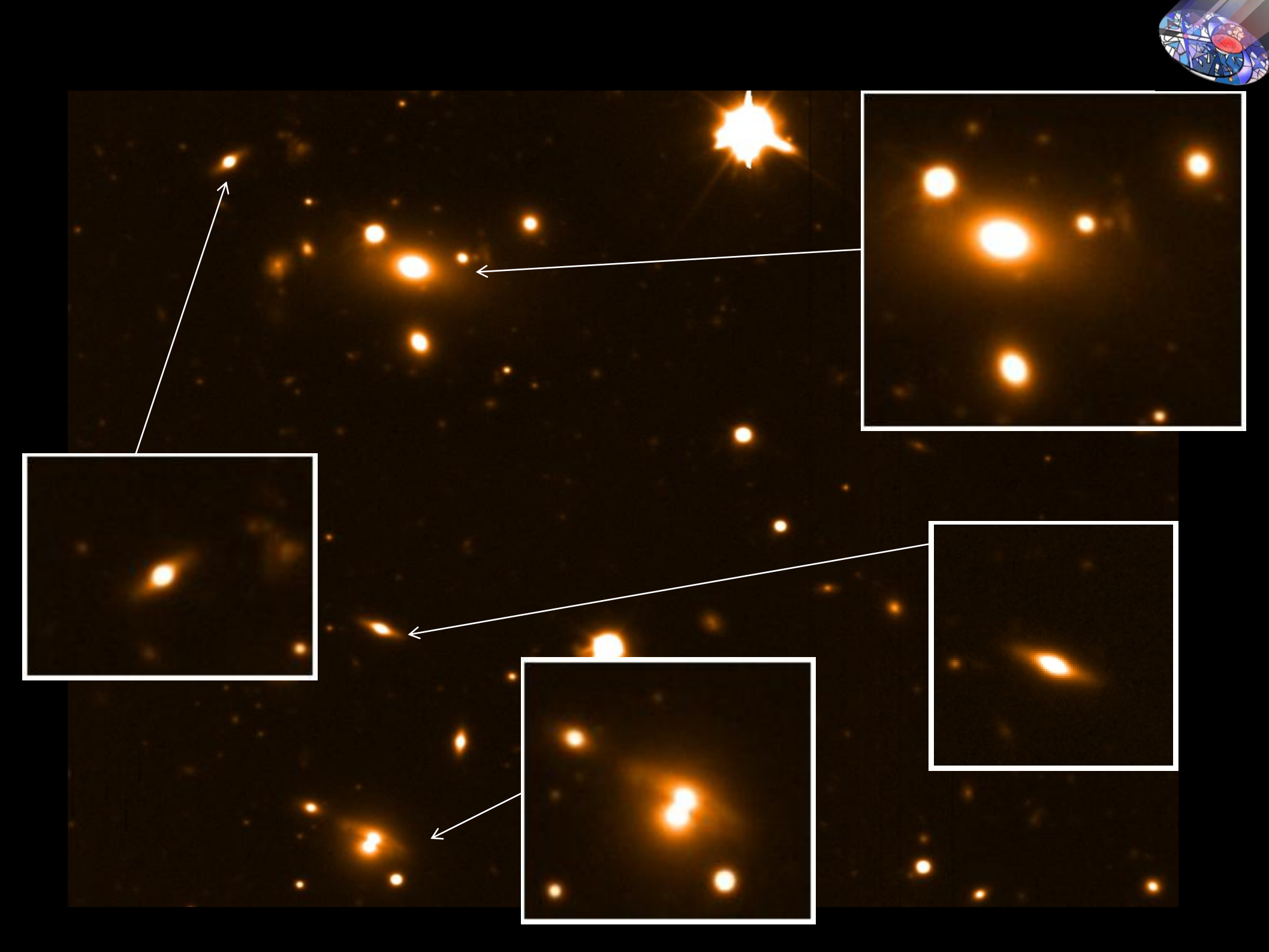


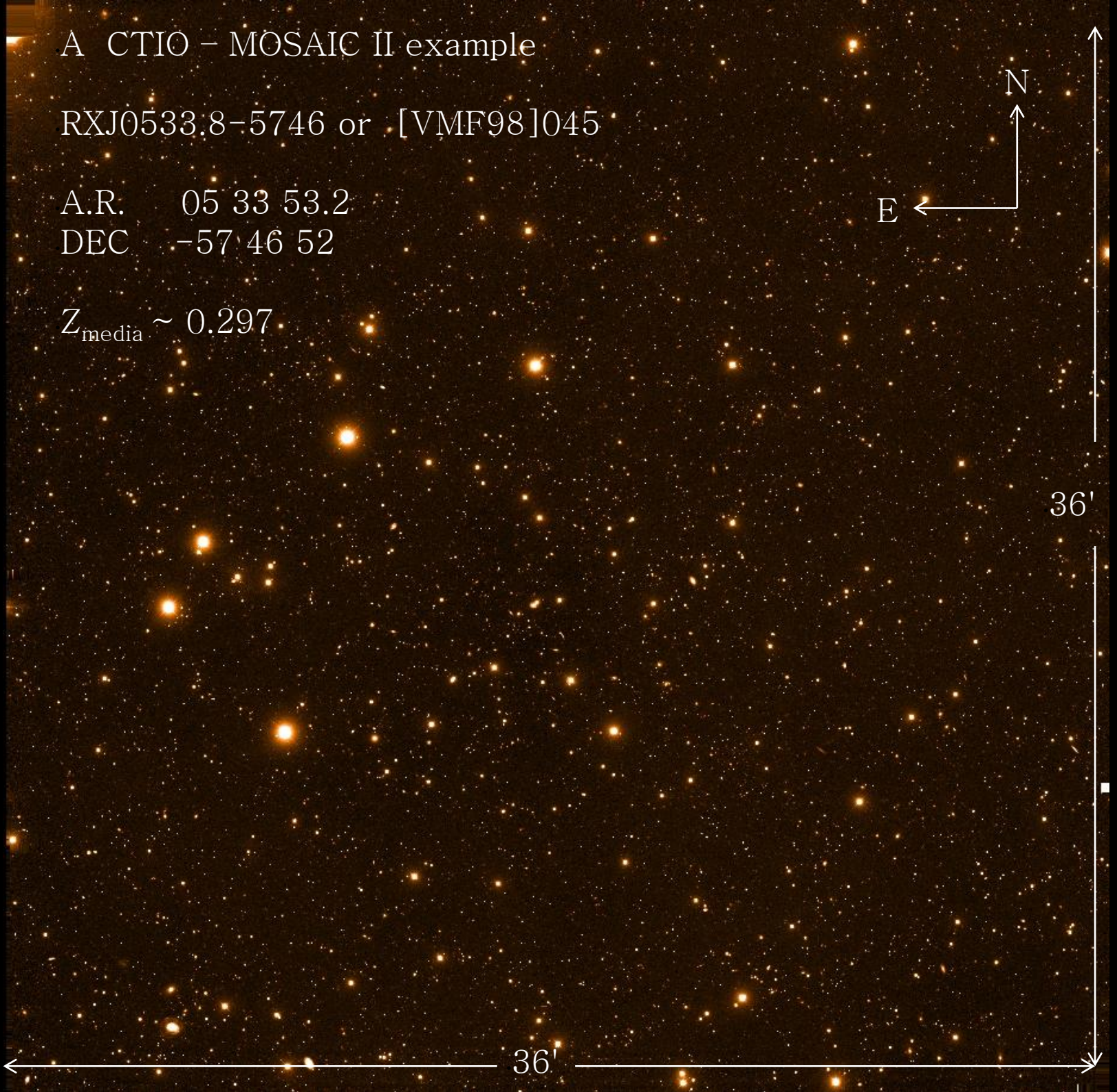
Repoted in 53º AAA




E
N
Final example
RXJ1252,0-2920 or [VMF98]124
A.R. 12 52 05.4
DEC -29 20 46
Z_{media} ~ 0.185


Near the central region ~ 0.5 mpc




A CTIO – MOSAIC II example
RXJ0533.8-5746 or [VMF98]045
A.R. 05 33 53.2
DEC -57 46 52
Z_{media} ~ 0.297
N
E
36'
36'

4. Some Results

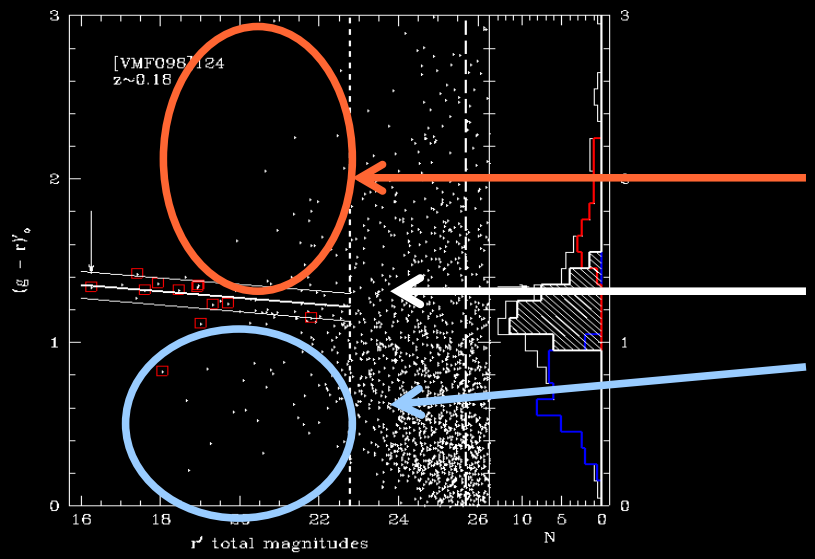
→ Low X-ray Luminosity Galaxy Clusters I : *Photometrical Properties*

→ Low X-ray Luminosity Galaxy Clusters II : *An Spectroscopical Analize*

→ Low X-ray Luminosity Galaxy Clusters III : *Deep CTIO-MOSAIC II Optical Observation*

→ *"GEMINI-GMOS deep observation of clusters between 0.3 to 0.7...."*

How evolve the RCS in these clusters??

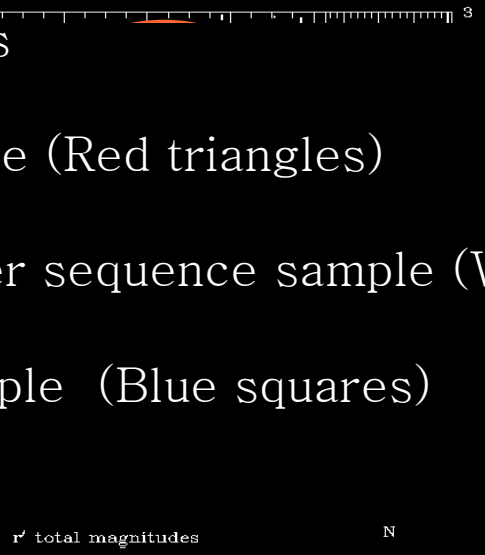


3 Samples

red sample (Red triangles)

red cluster sequence sample (White Circl

blue sample (Blue squares)



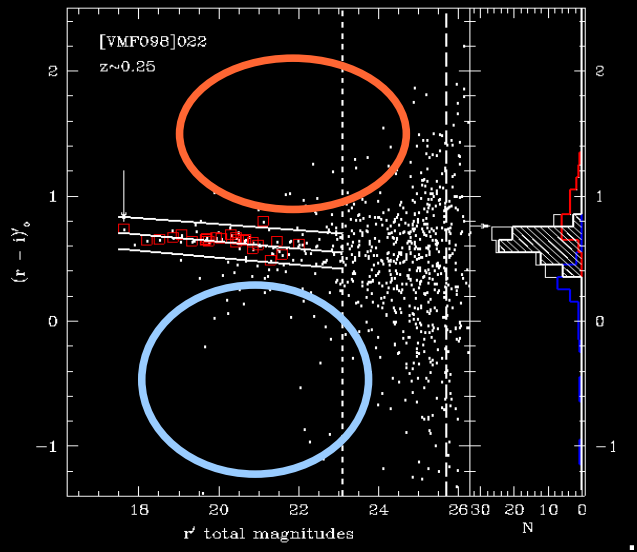
For the photometry :

Stuff + SkyMaker + Sextractor (Thank's god for the Astromatic's Softs!!)

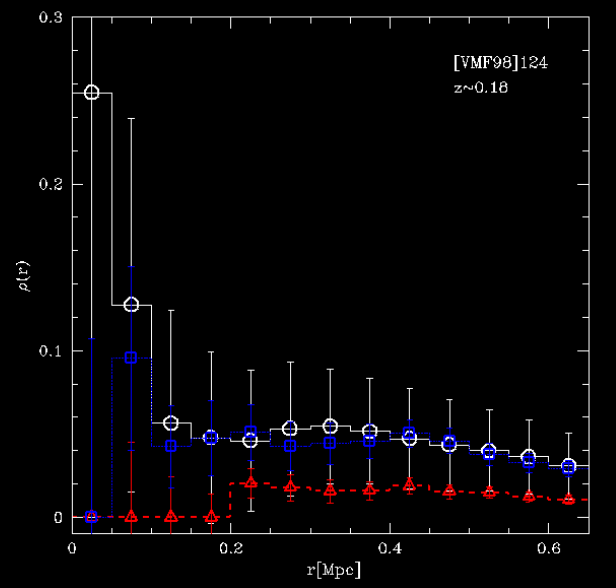
In CMD, all Galaxies in the GMOS – F.O.V are ploted

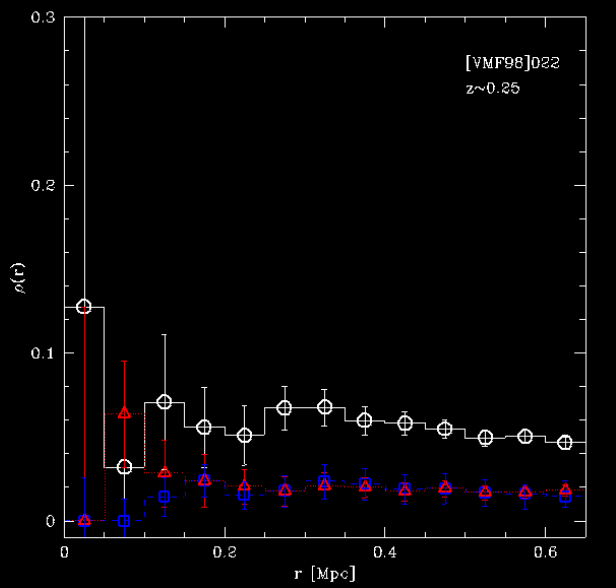
No K-correction

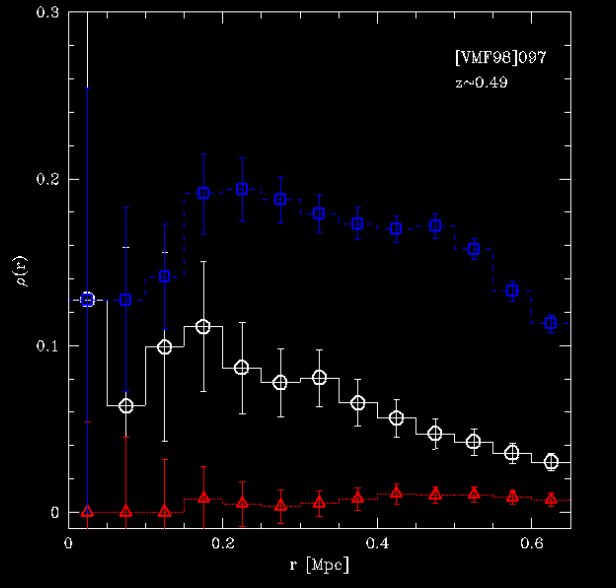
All magnitudes corrected using Cardelli Relations



Radius vs density





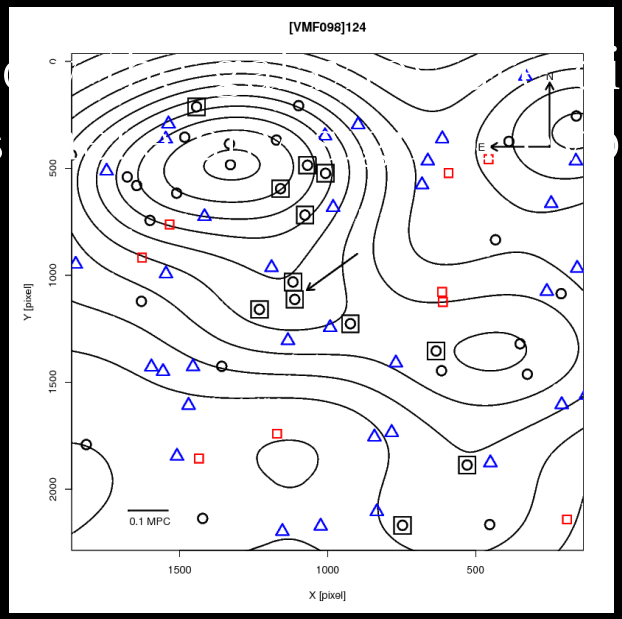


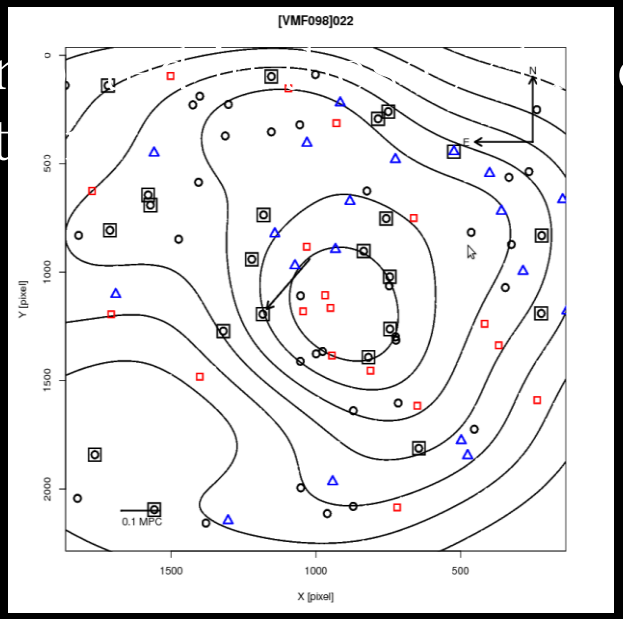
Again

White Circles : red cluster sequence sample
Blue squares : blue sample
Red triangles : red sample

Density maps

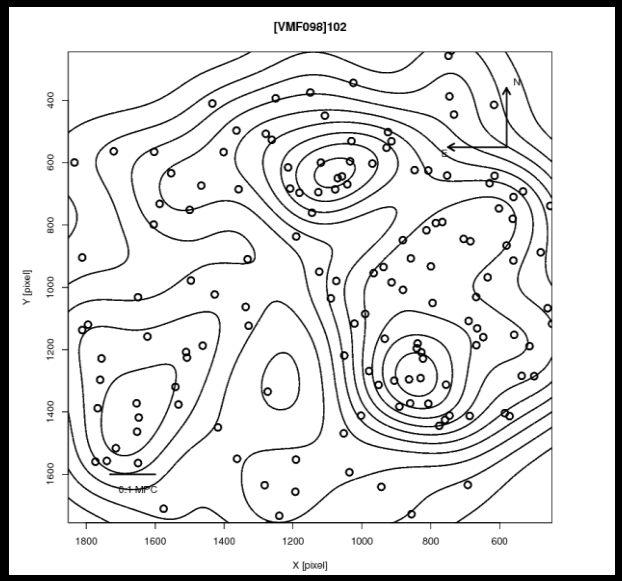
H ist ers??
Is lut

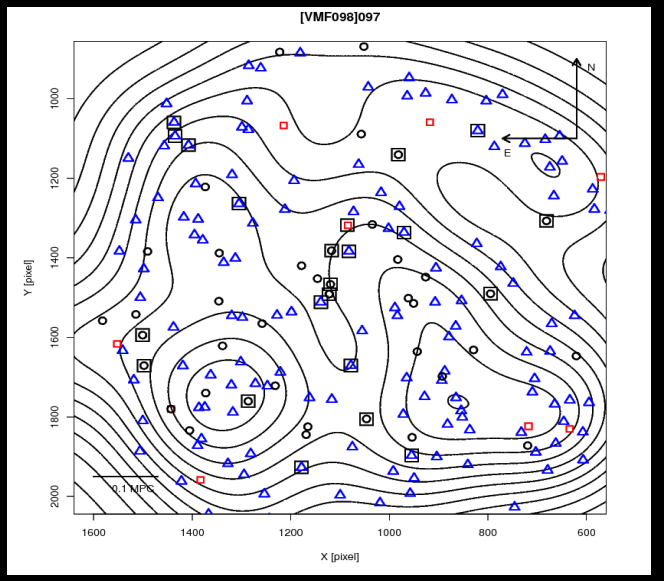




R and lattice package

All galaxy sample was used





And what about the morphology?

La Serena

GIM2d and GALFIT

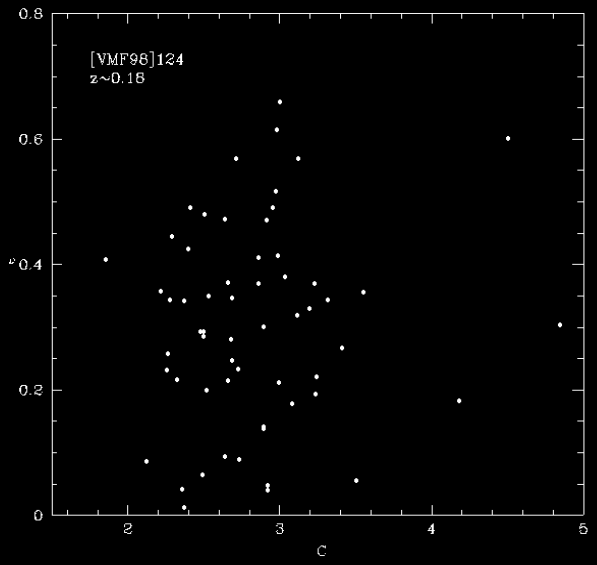
IATE

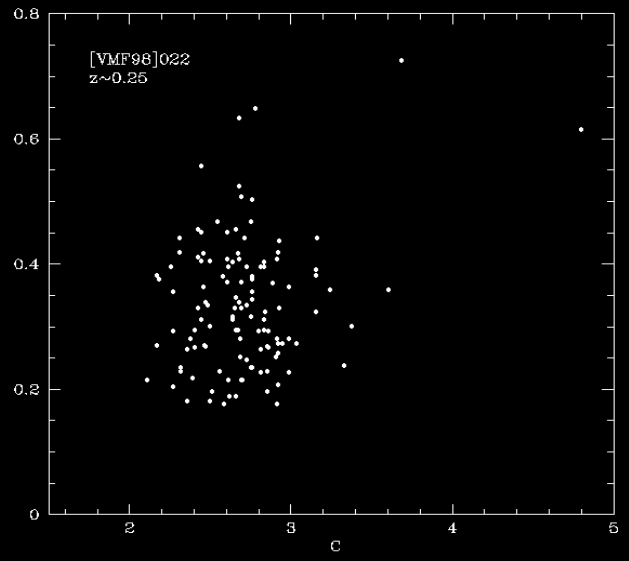
First:

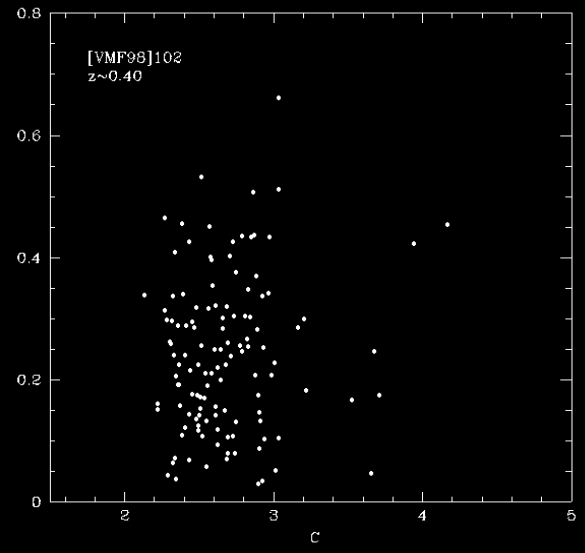
Concentration index and ellipticity

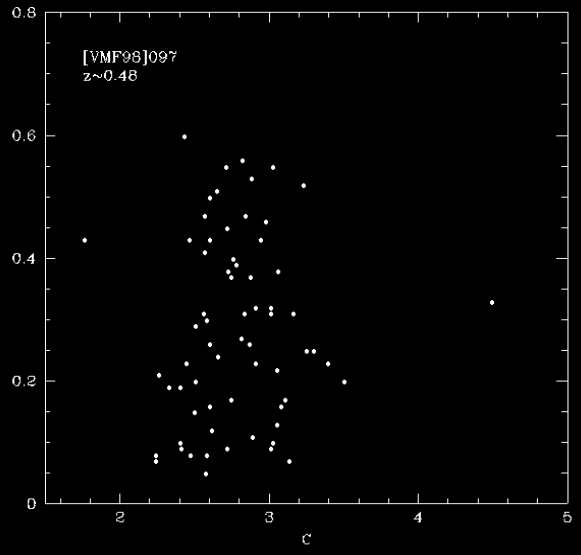
CAS

And then:
.....IDEAS???









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J.L. Nilo Castellón website

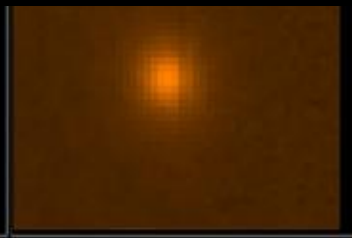
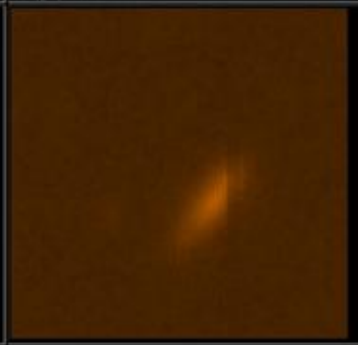
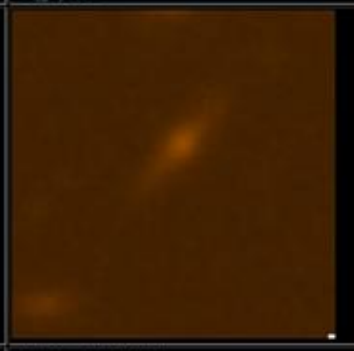
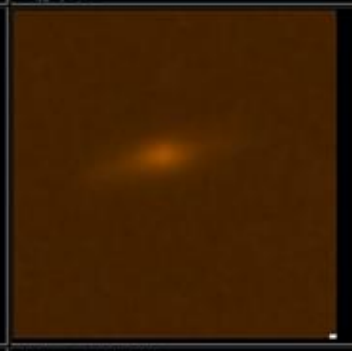
HOME JUST4DAN NEREIDA RESEARCH ARCHIVOS LINKS GALLERY

CONCENTRATION INDEX IMAGE CATALOGUES

Under Construction

Please Come Back Later

[VMF98]124, z~0.185

cD type, gx1111+1112	E type, gx1117+1030	E type, gx1230+1159		
r= 18.3750 ,(g-r)= 1.3010, C= 4.502	r= 18.5714 ,(g-r)= 1.2341, C= 4.841	r= 18.1611 ,(g-r)= 1.1976, C= 3.498		
				
S type, gx1172+0368, r= ,(g-r)= , C=	S type, gx1509+0616, r= ,(g-r)= , C=	S type, gx1599+0743, r= ,(g-r)= , C=	S type, gx0211+1085, r= ,(g-r)= , C=	S type, gx0349+1320, r= ,(g-r)= , C=
r= ,(g-r)= , C=	r= ,(g-r)= , C=	r= ,(g-r)= , C=	r= ,(g-r)= , C=	r= ,(g-r)= , C=
				
S0 type, gx1076+0718, r= ,(g-r)= , C=	S0 type, gx1159+0595, r= ,(g-r)= , C=	S0 type, gx0923+1226, r= ,(g-r)= , C=	S0 type, gx2107+1394, r= ,(g-r)= , C=	S0 type, gx0456+0457, r= ,(g-r)= , C=
r= ,(g-r)= , C=	r= ,(g-r)= , C=	r= ,(g-r)= , C=	r= ,(g-r)= , C=	r= ,(g-r)= , C=
				

Future
(when future means tomorrow or next month or next semester...)

→ *Complete the data reduction*
→ *Complete the image catalogue : more clusters, other filters.*

Future
(when future means next year or two or three...)

→ *a full spectroscopic data base of the cluster sample*

and that's All Folks.....por ahora!! GRACIAS!!!

"Entre más grande la prueba,más glorioso el triunfo"