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J/MNRAS/470/95 CLASH galaxies photometric redshifts in 25 ClG (Molino+, 2017)

CLASH: accurate photometric redshifts with 14 HST bands in massive galaxy cluster cores.

Molino A., Benitez N., Ascaso B., Coe D., Postman M., Jouvel S., Host O., Lahav O., Seitz S., Medezinski E., Rosati P., Schoenell W., Koekemoer A., Jimenez-teja Y., Broadhurst T., Melchior P., Balestra I., Bartelmann M., Bouwens R., Bradley L., Czakon N., Donahue M., Ford H., Graur O., Graves G., Grillo C., Infante L., Jha S.W., Kelson D., Lazkoz R., Lemze D., Maoz D., Mercurio A., Meneghetti M., Merten J., Moustakas L., Nonino M., Orgaz S., Riess A., Rodney S., Sayers J., Umetsu K., Zheng W., Zitrin A.

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ADC_Keywords: Clusters, galaxy ; Galaxies, photometry ; Redshifts

Keywords: methods: data analysis - methods: statistical - large-scale structure of Universe - cosmology: observations - catalog

Abstract:

We present accurate photometric redshifts for galaxies observed by the Cluster Lensing And Supernova survey with Hubble (CLASH). CLASH observed 25 massive galaxy cluster cores with the Hubble Space Telescope in 16 filters spanning 0.2-1.7μm. Photometry in such crowded fields is challenging. Compared to our previously released catalogues, we make several improvements to the photometry, including smaller apertures, intracluster light subtraction, point spread function matching and empirically measured uncertainties. We further improve the Bayesian photometric redshift estimates by adding a redder elliptical template and by inflating the photometric uncertainties of the brightest galaxies. The resulting photometric redshift accuracies are dz/(1+z)~0.8, 1.0 and 2.0 per cent for galaxies with I-band F814W AB magnitudes <18, 20 and 23, respectively. These results are consistent with our expectations. They improve on our previously reported accuracies by a factor of 4 at the bright end and a factor of 2 at the faint end. Our new catalogue includes 1257 spectroscopic redshifts, including 382 confirmed cluster members. We also provide stellar mass estimates. Finally, we include lensing magnification estimates of background galaxies based on our public lens models. Our new catalogue of all 25 CLASH clusters is available via Mikulski Archive for Space Telescopes. The analysis techniques developed here will be useful in other surveys of crowded fields, including the Frontier Fields and surveys carried out with Javalambre-Physics of the Accelerated Universe Astrophysical Survey and James Webb Space Telescope.

Description:

New photometric redshift catalogue for the 25 CLASH massive galaxy clusters. The catalogue includes astrometric, morphologic, photometric and photo-z information for all detected sources in an NIR detection image (e.g. a weighted sum of WFC3/IR images: F105W, F110W, F125W, F140W, F160W).

File Summary:

FileName	Lrecl	Records	Explanations
ReadMe	80	.	This file
table1.dat	60	25	The CLASH galaxy cluster sample
a383.dat	812	1912	Abell 383 photometric redshift catalogue
a209.dat	812	2069	Abell 209 photometric redshift catalogue
a1423.dat	812	1984	Abell 1423 photometric redshift catalogue
a2261.dat	812	1728	Abell 2261 photometric redshift catalogue
rxj2129.dat	812	1547	RX J2129+0005 photometric redshift catalogue
a611.dat	812	1123	Abell 611 photometric redshift catalogue
ms2137.dat	812	1736	MS2137-2353 photometric redshift catalogue
rxj1532.dat	812	1347	RX J1532.8+3021 photometric redshift catalogue
rxj2248.dat	812	1645	RX J2248-4431 photometric redshift catalogue
macs1931.dat	812	1633	MACS J1931-26 photometric redshift catalogue
macs1115.dat	812	1376	MACS J1115+0129 photometric redshift catalogue
macs1720.dat	812	1609	MACS J1720+3536 photometric redshift catalogue
macs0429.dat	812	1677	MACS J0429-02 photometric redshift catalogue
macs0416.dat	812	1754	MACS J0416-24 photometric redshift catalogue
macs1206.dat	812	1668	MACS J1206-08 photometric redshift catalogue
macs0329.dat	812	1617	MACS J0329-02 photometric redshift catalogue
rxj1347.dat	812	1698	RX J1347-1145 photometric redshift catalogue
macs1311.dat	812	1641	MACS J1311-03 photometric redshift catalogue
macs1423.dat	812	1709	MACS J1423.8+2404 photometric redshift catalogue
macs1149.dat	812	1656	MACS J1149+22 photometric redshift catalogue
macs0717.dat	812	1822	MACS J0717+37 photometric redshift catalogue
macs2129.dat	812	1845	MACS J2129+0005 photometric redshift catalogue

macs0647.dat	812	1774	MACS J0647+70 photometric redshift catalogue
macs0744.dat	812	1792	MACS J0744+39 photometric redshift catalogue
clj1226.dat	812	1940	CL J1226+3332 photometric redshift catalogue

See also:
https://archive.stsci.edu/prepds/clash : CLASH home Page

Byte-by-byte Description of file: table1.dat

Bytes	Format	Units	Label	Explanations
1- 17	A17	---	Name	Cluster name
19- 23	F5.3	---	z	Mean spectroscopic redshift
27- 34	F8.4	deg	RAdeg	Right ascension (J2000)
37- 44	F8.4	deg	DEdeg	Declination (J2000)
48- 51	I4	---	Ngal	Number of galaxies in the associated catalog
53- 60	A8	---	Cluster	Cluster short name

Byte-by-byte Description of file: [acmr]*.dat

Bytes	Format	Units	Label	Explanations
1- 23	A23	---	CLASHID	Object ID Number [clash$_{*cluster*}$nir_*SExtID*]
25- 32	A8	---	Cluster	Cluster short Name
34- 41	F8.4	deg	RAdeg	Right Ascension (J2000)
43- 50	F8.4	deg	DEdeg	Declination (J2000)
52- 59	F8.3	pix	Xpos	X-pixel coordinate
61- 68	F8.3	pix	Ypos	Y-pixel coordinate
70- 74	I5	pix	Area	Isophotal aperture area (pixels)
76- 81	F6.2	arcsec	FWHM	Full width at half maximum for detection image
83- 88	F6.2	---	s2n	Signal to Noise (SExt$_{FLUX}$AUTO/SExt$_{FLUXERR}$AUTO)
90- 91	I2	---	photFlag	SExtractor Photometric Flag
93- 94	I2	---	nfobs	Number Filters Observed (out of 24)
96- 97	I2	---	nfdet	Number Filters Detected (out of 24)
99	I1	---	PS	[0/1] Pointsource flag (0: extended / 1: point-like)
101-106	F6.2	---	theta	Position Angle (CCW/x)
108-114	F7.3	pix	a	Profile RMS along major axis
116-121	F6.3	pix	b	Profile RMS along minor axis
123-129	F7.4	---	Backg	Background-signal subtracted from Detection
131-138	F8.3	pix	rf	Fraction-of-light radii
140-143	F4.2	pix	rk	Kron-apertures in units of A or B
145-149	F5.2	pix	rp	Petrosian radii
151-159	F9.4	deg	RABdeg	BCG position in Right Ascension (J2000)
161-169	F9.4	deg	DEBdeg	BCG position in Declination (J2000)
171-176	F6.4	Mpc	PDistBCG	Projected Physical Distance to BCG
178-184	F7.3	mag	F225WPZ	?=99 F225W/WFC3 restricted magnitude (AB); best for photo-z (F225W$_{WFC3}$PHOTOZ)
186-194	F9.3	mag	e_F225WPZ	F225W/WFC3 restricted magnitude uncertainty (AB); best for photo-z (e$_{F225W}$WFC3_PHOTOZ)
196-201	F6.3	mag	F225WM	?=99 F225W/WFC3 moderated magnitude (AB); best for stellar mass (F225W$_{WFC3}$MASS)
203-210	F8.3	mag	e_F225WM	F225W/WFC3 moderated magnitude uncertainty (AB) best for stellar mass (e$_{F225W}$WFC3_MASS)
212-217	F6.3	mag	F275WPZ	?=99 F275W/WFC3 restricted magnitude (AB); best for photo-z (F275W$_{WFC3}$PHOTOZ)
219-226	F8.3	mag	e_F275WPZ	F275W/WFC3 restricted magnitude uncertainty (AB); best for photo-z (e$_{F275W}$WFC3_PHOTOZ)
228-233	F6.3	mag	F275WM	?=99 F275W/WFC3 moderated magnitude (AB); best for stellar mass (F275W$_{WFC3}$MASS)
235-242	F8.3	mag	e_F275WM	F275W/WFC3 moderated magnitude uncertainty (AB) best for stellar mass (e$_{F275W}$WFC3_MASS)
244-249	F6.3	mag	F336WPZ	?=99 F336W/WFC3 restricted magnitude (AB); best for photo-z (F336W$_{WFC3}$PHOTOZ)
251-259	F9.3	mag	e_F336WPZ	F336W/WFC3 restricted magnitude uncertainty (AB); best for photo-z (e$_{F336W}$WFC3_PHOTOZ)
261-266	F6.3	mag	F336WM	?=99 F336W/WFC3 moderated magnitude (AB); best for stellar mass (F336W$_{WFC3}$MASS)
268-276	F9.3	mag	e_F336WM	F336W/WFC3 moderated magnitude uncertainty (AB) best for stellar mass (e$_{F336W}$WFC3_MASS)
278-283	F6.3	mag	F390WPZ	?=99 F390W/WFC3 restricted magnitude (AB); best for photo-z (F390W$_{WFC3}$PHOTOZ)
285-293	F9.3	mag	e_F390WPZ	F390W/WFC3 restricted magnitude uncertainty (AB); best for photo-z (e$_{F390W}$WFC3_PHOTOZ)
295-300	F6.3	mag	F390WM	?=99 F390W/WFC3 moderated magnitude (AB);

				best for stellar mass ($F390W_{WFC3}MASS$)
302-311	F10.3	mag	e_F390WM	F390W/WFC3 moderated magnitude uncertainty (AB) best for stellar mass ($e_{F390W}WFC3_MASS$)
313-318	F6.3	mag	F435WPZ	?=99 F435W/ACS restricted magnitude (AB) best for photo-z ($F435W_{ACS}PHOTOZ$)
320-328	F9.3	mag	e_F435WPZ	F435W/ACS restricted magnitude uncertainty (AB) best for photo-z ($e_{F435W}ACS_PHOTOZ$)
330-335	F6.3	mag	F435WM	?=99 F435W/ACS moderated magnitude (AB) best for stellar mass ($F435W_{ACS}MASS$)
337-345	F9.3	mag	e_F435WM	F435W/ACS moderated magnitude uncertainty (AB) best for stellar mass ($e_{F435W}ACS_MASS$)
347-352	F6.3	mag	F475WPZ	?=99 F475W/ACS restricted magnitude (AB) best for photo-z ($F475W_{ACS}PHOTOZ$)
354-362	F9.3	mag	e_F475WPZ	F475W/ACS restricted magnitude uncertainty (AB) best for photo-z ($e_{F475W}ACS_PHOTOZ$)
364-369	F6.3	mag	F475WM	?=99 F475W/ACS moderated magnitude (AB) best for stellar mass ($F475W_{ACS}MASS$)
371-378	F8.3	mag	e_F475WM	F475W/ACS moderated magnitude uncertainty (AB) best for stellar mass ($e_{F475W}ACS_MASS$)
380-385	F6.3	mag	F606WPZ	?=99 F606W/ACS restricted magnitude (AB) best for photo-z ($F606W_{ACS}PHOTOZ$)
387-395	F9.3	mag	e_F606WPZ	F606W/ACS restricted magnitude uncertainty (AB) best for photo-z ($e_{F606W}ACS_PHOTOZ$)
397-402	F6.3	mag	F606WM	?=99 F606W/ACS moderated magnitude (AB) best for stellar mass ($F606W_{ACS}MASS$)
404-411	F8.3	mag	e_F606WM	F606W/ACS moderated magnitude uncertainty (AB) best for stellar mass ($e_{F606W}ACS_MASS$)
413-418	F6.3	mag	F625WPZ	?=99 F625W/ACS restricted magnitude (AB) best for photo-z ($F625W_{ACS}PHOTOZ$)
420-428	F9.3	mag	e_F625WPZ	F625W/ACS restricted magnitude uncertainty (AB) best for photo-z ($e_{F625W}ACS_PHOTOZ$)
430-435	F6.3	mag	F625WM	?=99 F625W/ACS moderated magnitude (AB) best for stellar mass ($F625W_{ACS}MASS$)
437-445	F9.3	mag	e_F625WM	F625W/ACS moderated magnitude uncertainty (AB) best for stellar mass ($e_{F625W}ACS_MASS$)
447-452	F6.3	mag	F775WPZ	?=99 F775W/ACS restricted magnitude (AB) best for photo-z ($F775W_{ACS}PHOTOZ$)
454-462	F9.3	mag	e_F775WPZ	F775W/ACS restricted magnitude uncertainty (AB) best for photo-z ($e_{F775W}ACS_PHOTOZ$)
464-469	F6.3	mag	F775WM	?=99 F775W/ACS moderated magnitude (AB) best for stellar mass ($F775W_{ACS}MASS$)
471-478	F8.3	mag	e_F775WM	F775W/ACS moderated magnitude uncertainty (AB) best for stellar mass ($e_{F775W}ACS_MASS$)
480-485	F6.3	mag	F814WPZ	?=99 F814W/ACS restricted magnitude (AB) best for photo-z ($F814W_{ACS}PHOTOZ$)
487-495	F9.3	mag	e_F814WPZ	F814W/ACS restricted magnitude uncertainty (AB) best for photo-z ($e_{F814W}ACS_PHOTOZ$)
497-502	F6.3	mag	F814WM	?=99 F814W/ACS moderated magnitude (AB) best for stellar mass ($F814W_{ACS}MASS$)
504-512	F9.3	mag	e_F814WM	F814W/ACS moderated magnitude uncertainty (AB) best for stellar mass ($e_{F814W}ACS_MASS$)
514-519	F6.3	mag	F850LPPZ	?=99 F850LP/ACS restricted magnitude (AB) best for photo-z ($F850LP_{ACS}PHOTOZ$)
521-528	F8.3	mag	e_F850LPPZ	F850LP/ACS restricted magnitude uncertainty (AB) best for photo-z ($e_{F850LP}ACS_PHOTOZ$)
530-535	F6.3	mag	F850LPM	?=99 F850LP/ACS moderated magnitude (AB) best for stellar mass ($F850LP_{ACS}MASS$)
537-544	F8.3	mag	e_F850LPM	F850LP/ACS moderated magnitude uncertainty (AB) best for stellar mass ($e_{F850LP}ACS_MASS$)
546-551	F6.3	mag	F105WPZ	?=99 F105W/WFC3 restricted magnitude (AB) best for photo-z ($F105W_{WFC3}PHOTOZ$)
553-560	F8.3	mag	e_F105WPZ	F105W/WFC3 restricted magnitude uncertainty (AB) best for photo-z ($e_{F105W}WFC3_PHOTOZ$)
562-567	F6.3	mag	F105WM	?=99 F105W/WFC3 moderated magnitude (AB) best for stellar mass ($F105W_{WFC3}MASS$)
569-575	F7.3	mag	e_F105WM	F105W/WFC3 moderated magnitude uncertainty (AB) best for stellar mass ($e_{F105W}WFC3_MASS$)
577-582	F6.3	mag	F110WPZ	?=99 F110W/WFC3 restricted magnitude (AB) best for photo-z ($F110W_{WFC3}PHOTOZ$)
584-590	F7.3	mag	e_F110WPZ	F110W/WFC3 restricted magnitude uncertainty (AB) best for photo-z ($e_{F110W}WFC3_PHOTOZ$)
592-597	F6.3	mag	F110WM	?=99 F110W/WFC3 moderated magnitude (AB) best for stellar mass ($F110W_{WFC3}MASS$)
599-605	F7.3	mag	e_F110WM	F110W/WFC3 moderated magnitude uncertainty (AB) best for stellar mass ($e_{F110W}WFC3_MASS$)
607-612	F6.3	mag	F125WPZ	?=99 F125W/WFC3 restricted magnitude (AB) best for photo-z ($F125W_{WFC3}PHOTOZ$)
614-622	F9.3	mag	e_F125WPZ	F125W/WFC3 restricted magnitude uncertainty (AB) best for photo-z ($e_{F125W}WFC3_PHOTOZ$)
624-629	F6.3	mag	F125WM	?=99 F125W/WFC3 moderated magnitude (AB) best for stellar mass ($F125W_{WFC3}MASS$)
631-639	F9.3	mag	e_F125WM	F125W/WFC3 moderated magnitude uncertainty (AB)

				best for stellar mass (e_{F125W}WFC3_MASS)
641-646	F6.3	mag	F140WPZ	?=99 F140W/WFC3 restricted magnitude (AB) best for photo-z ($F140W_{WFC3}$PHOTOZ)
648-655	F8.3	mag	e_F140WPZ	F140W/WFC3 restricted magnitude uncertainty (AB) best for photo-z (e_{F140W}WFC3_PHOTOZ)
657-663	F7.3	mag	F140WM	?=99 F140W/WFC3 moderated magnitude (AB) best for stellar mass ($F140W_{WFC3}$MASS)
665-672	F8.3	mag	e_F140WM	F140W/WFC3 moderated magnitude uncertainty (AB) best for stellar mass (e_{F140W}WFC3_MASS)
674-679	F6.3	mag	F160WPZ	?=99 F160W/WFC3 restricted magnitude (AB) best for photo-z ($F160W_{WFC3}$PHOTOZ)
681-687	F7.3	mag	e_F160WPZ	F160W/WFC3 restricted magnitude uncertainty (AB) best for photo-z (e_{F160W}WFC3_PHOTOZ)
689-694	F6.3	mag	F160WM	?=99 F160W/WFC3 moderated magnitude (AB) best for stellar mass ($F160W_{WFC3}$MASS)
696-702	F7.3	mag	e_F160WM	F160W/WFC3 moderated magnitude uncertainty (AB) best for stellar mass (e_{F160W}WFC3_MASS)
704-708	F5.3	---	zCluster	Cluster Redshift
710-715	F6.3	---	zb1	[0/10] BPZ most likely redshift for the First Peak
717-722	F6.3	---	e_zb1	Lower limit (95p confidence) for the First Peak
724-729	F6.3	---	E_zb1	Upper limit (95p confidence) for the First Peak
731-735	F5.2	---	Tb1	BPZ most likely spectral type for the First Peak
737-740	F4.2	---	Odds1	P(z) contained within zb±2*0.03*(1+z) for the First Peak
742-748	F7.2	---	Chi2	Poorness of BPZ fit: observed vs. model fluxes
750-756	F7.3	mag	BMAG	Absolute magnitude (AB) (B_JOHNSON) for the First Peak
758-763	F6.2	[Msun]	logM*	?=-99 Stellar Mass for the First Peak (log10(M_sun))
765-770	F6.3	mag	F814W	? Lensing-corrected F814WM magnitude ($F814W_{ACS}$MASS_LensCor)
772-778	F7.3	mag	BMAGLC	?=-99 Lensing-corrected Absolute Magnitude (AB) (B_JOHNSON) (MB_LensCor)
780-786	F7.3	[Msun]	logM*LC	?=-99 Lensing-corrected Stellar Mass for the First Peak (log10(M_sun))
788-794	F7.3	---	zsp	?=-99 Spectroscopic Redshift [-99 if unknown]
796-808	A13	---	r_zsp	Reference for the Spectroscopic Redshift
810-812	I3	---	q_zsp	[0/2]?=-99 Quality of the Spectroscopic Redshift [0:secure, 1:likely, 2:unsure] (1)

Note (1): Quality of the Spectroscopic Redshift as follows:
0 = secure
1 = likely
2 = unsure

History:
Copied at https://archive.stsci.edu/prepds/clash/

(End) Patricia Vannier [CDS] 22-Apr-2020

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