J/ApJS/256/9 Euclid preparation. XIV. C3R2 survey DR3 (Stanford+, 2021)

Euclid preparation.
XIV. The Complete Calibration of the Color-Redshift Relation (C3R2) survey: data release 3.

Stanford S.A., Masters D., Darvish B., Stern D., Cohen J.G., Capak P., Hernitschek N., Davidzon I., Rhodes J., Sanders D.B., Mobasher B., Castander F.J., Paltani S., Aghanim N., Amara A., Auricchio N., Balestra A., Bender R., Bodendorf C., Bonino D., Branchini E., Brinchmann J., Capobianco V., Carbone C., Carretero J., Casas R., Castellano M., Cavuoti S., Cimatti A., Cledassou R., Conselice C.J., Corcione L., Costille A., Cropper M., Degaudenzi H., Douspis M., Dubath F., Dusini S., Fosalba P., Frailis M., Franceschi E., Franzetti P., Fumana M., Garilli B., Giocoli C., Grupp F., Haugan S.V.H., Hoekstra H., Holmes W., Hormuth F., Hudelot P., Jahnke K., Kiessling A., Kilbinger M., Kitching T., Kubik B., Kummel M., Kunz M., Kurki-Suonio H., Laureijs R., Ligori S., Lilje P.B., Lloro I., Maiorano E., Marggraf O., Markovic K., Massey R., Meneghetti M., Meylan G., Moscardini L., Niemi S.M., Padilla C., Pasian F., Pedersen K., Pettorino V., Pires S., Poncet M., Popa L., Pozzetti L., Raison F., Roncarelli M., Rossetti E., Saglia R., Scaramella R., Schneider P., Secroun A., Seidel G., Serrano S., Sirignano C., Sirri G., Taylor A.N., Teplitz H.I., Tereno I., Toledo-Moreo R., Valentijn E.A., Valenziano L., Verdoes Kleijn G.A., Wang Y., Zamorani G., Zoubian J., Brescia M., Congedo G., Conversi L., Copin Y., Kermiche S., Kohley R., Medinaceli E., Mei S., Moresco M., Morin B., Munari E., Polenta G., Sureau F., Tallada Crespi P., Vassallo T., Zacchei A., Andreon S., Aussel H., Baccigalupi C., Balaguera-Antolinez A., Baldi M., Bardelli S., Biviano A., Borsato E., Bozzo E., Burigana C., Cabanac R., Camera S., Cappi A., Carvalho C.S., Casas S., Castignani G., Colodro-Conde C., Coupon J., Courtois H.M., Cuby J.-G., Da Silva A., De La Torre S., Di Ferdinando D., Duncan C.A.J., Dupac X., Fabricius M., Farina M., Farrens S., Ferreira P.G., Finelli F., Flose-Reimberg P., Fotopoulou S., Galeotta S., Ganga K., Gillard W., Gozaliasl G., Gracia-Carpio J., Keihanen E., Kirkpatrick C.C., Lindholm V., Mainetti G., Maino D., Martinet N., Marulli F., Maturi M., Maurogordato S., Metcalf R.B., Nakajima R., Neissner C., Nightingale J.W., Nucita A.A., Patrizii L., Potter D., Renzi A., Riccio G., Romelli E., Sanchez A.G., Sapone D., Schirmer M., Schultheis M., Scottez V., Stanco L., Tenti M., Teyssier R., Torradeflot F., Valiviita J., Viel M., Whittaker L., Zucca E.

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ADC_Keywords: Galaxies, spectra; Spectra, infrared; Optical; Redshifts; Photometry, RI; Surveys
Keywords: Galaxy spectroscopy

Abstract:
The Complete Calibration of the Color-Redshift Relation (C3R2) survey is obtaining spectroscopic redshifts in order to map the relation

between galaxy color and redshift to a depth of i~24.5 (AB). The primary goal is to enable sufficiently accurate photometric redshifts for Stage IV dark energy projects, particularly Euclid and the Nancy Grace Roman Space Telescope (Roman), which are designed to constrain cosmological parameters through weak lensing. We present 676 new high-confidence spectroscopic redshifts obtained by the C3R2 survey in the 2017B-2019B semesters using the DEIMOS, LRIS, and MOSFIRE multiobject spectrographs on the Keck telescopes. Combined with the 4454 redshifts previously published by this project, the C3R2 survey has now obtained and published 5130 high-quality galaxy spectra and redshifts. If we restrict consideration to only the $0.2<z_p<2.6$ range of interest for the Euclid cosmological goals, then with the current data release, C3R2 has increased the spectroscopic redshift coverage of the Euclid color space from 51% (as reported by Masters+ 2017, J/ApJ/841/111) to the current 91%. Once completed and combined with extensive data collected by other spectroscopic surveys, C3R2 should provide the spectroscopic calibration set needed to enable photometric redshifts to meet the cosmology requirements for Euclid, and make significant headway toward solving the problem for Roman.

Description:
The observations were carried out at the Keck Observatory located on Maunakea in Hawaii. Both of the two 10m telescopes were used, as the Low Resolution Imaging Spectrometer (LRIS) and Multi-Object Spectrometer For Infra-Red Exploration (MOSFIRE) are located on KeckI and the DEep Imaging Multi-Object Spectrograph (DEIMOS) on KeckII. The 19 observing nights span 2017 Dec 11 to 2020 Oct 19.

Observations for DR3 were carried out essentially in the same manner as described in M17 (Masters+ 2017, J/ApJ/841/111) and M19 (Masters+ 2019, J/ApJ/877/81) for the previous data releases.

File Summary:

FileName	Lrecl	Records	Explanations
ReadMe	80	.	This file
table4.dat	175	676	C3R2 DR3 spectroscopic redshifts
sp/*	.	1137	1D and 2D individual spectra in FITS format

Description of the files:
DR3.zip is a zip file of the 1137 spectra in FITS format.

See also:
II/284 : COSMOS Multi-Wavelength Photometry Catalog (Capak+, 2007)
II/286 : VIRMOS deep imaging survey. VVDS-F02 catalog (VIRMOS team+, 2008)
II/317 : The CFHTLS Survey (T0007 release) (Hudelot+ 2012)
II/347 : KiDS-ESO-DR3 multi-band source catalog (de Jong+, 2017)
J/ApJ/690/1236 : COSMOS photometric redshift catalog (Ilbert+, 2009)
J/ApJ/769/80 : Spitzer/IRAC observations of five deep fields (Ashby+, 2013)
J/ApJ/795/165 : Line ratios in z~2-3 gal. from KBSS-MOSFIRE (Steidel+, 2014)
J/ApJS/224/24 : The COSMOS2015 catalog (Laigle+, 2016)
J/ApJ/841/111 : C3R2 survey: high-conf. redshifts from DR1 (Masters+, 2017)
J/ApJ/877/81 : The C3R2 survey: DR2 new sp. redshifts (Masters+, 2019)

J/A+A/642/A192 : C3R2-KMOS zsp & galaxy physical data (Euclid Coll., 2020)
http://koa.ipac.caltech.edu/Datasets/C3R2/ : KOA C3R2 home page

Byte-by-byte Description of file: table4.dat

Bytes	Format	Units	Label	Explanations
1- 11	A11	---	Field	Field (COSMOS, COSMOS-S12B, VVDS, EGS, "ser_COSMOS", "ser_VVDS" or "serendip") (1)
13- 18	I6	---	ID	[686/963558]? Identifier within Field (1)
20- 21	I2	h	RAh	Hour of Right Ascension (J2000)
23- 24	I2	min	RAm	Minute of Right Ascension (J2000)
26- 30	F5.2	s	RAs	Second of Right Ascension (J2000)
32	A1	---	DE-	Sign of the Declination (J2000)
33- 34	I2	deg	DEd	Degree of Declination (J2000)
36- 37	I2	arcmin	DEm	Arcminute of Declination (J2000)
39- 42	F4.1	arcsec	DEs	Arcsecond of Declination (J2000)
44- 61	A18	---	Mask	Mask name
63- 64	I2	---	Slit	[0/88] Slit number on mask
66- 71	F6.2	mag	imag	[18.78/25.57]?=-1 i-band AB magnitude
73- 78	F6.4	---	zspec	[0/4.18] Measured spectroscopic redshift
80- 82	F3.1	---	Qual	[3/4] Redshift quality flag (2)
84- 90	A7	---	Inst	Keck spectrograph (3)
92-136	A45	---	FileName	Name of the 1D spectrum file in subdirectory "sp" (4)
138-175	A38	---	FileName2	A second name of the file in subdirectory "sp" (red part) for 5 galaxies; column added by CDS

Note (1): All 18 serendipitous detections are given the identifier "serendip".
    Where these correspond to sources in existing photometric catalogs we use the catalog ID prepended by "ser" (48 occurrences).
    True serendipitous sources do not have values in the magnitude column.
    The catalog contains a small number of known duplicate observations.
Note (2): Quality flag as in Masters+ (2017, J/ApJ/841/111) as follows:
    4.0 = certain;
    3.5 = very high confidence but based on a single line detection;
    3.0 = high confidence.
Note (3): Instrument as follows:
    DEIMOS = the DEep Imaging Multi-Object Spectrograph
              on Keck II (5000{AA}-1um, R~3000; 410 occurrences)
    MOSFIRE = the Multi-Object Spectrometer For Infra-Red Exploration
              on Keck I (H-band, R~3000; 175 occurrences)
    LRIS   = the Low Resolution Imaging Spectrometer
              on Keck I (~3200{AA}-1um, 300<R<5000; 91 occurrences)
Note (4): Sources with NULL value in "FileName" field have not yet been delivered to the Keck Observatory Archive (KOA). This includes the serendipitous sources.

History:
    From electronic version of the journal for Table 4.

Spectra sent by the author.

Acknowledgements:
Adam Stanford [stanford _at_ physics.ucdavis.edu]

References:

EUCLID Col.	Paper II.	2019MNRAS.484.5509E	
EUCLID Col.	Paper III.	2019A&A...627A..23E	
EUCLID Col.	Paper V.	2019A&A...631A..85E	
EUCLID Col.	Paper VI.	2020A&A...635A.139E	
EUCLID Col.	Paper VII.	2020A&A...642A.191E	
EUCLID Col.	Paper VIII.	2020A&A...642A.192E	Cat. J/A+A/642/A192
EUCLID Col.	Paper IX.	2021MNRAS.505.2840E	
EUCLID Col.	Paper X.	2020A&A...644A..31E	
EUCLID Col.	Paper XI.	2021A&A...647A.117E	
Stanford et al.	Paper XIV.	2021ApJS..256....9S	This catalog

(End) Prepared by [AAS], Emmanuelle Perret [CDS] 28-Oct-2021