J/MNRAS/491/5524 Discovering Large-Scale Structure in ORELSE Survey (Hung+ 2020)

Establishing a new technique for discovering large-scale structure using the
ORELSE survey.
Hung D., Lemaux B.C., Gal R.R., Tomczak A.R., Lubin L.M., Cucciati O.,
Pelliccia D., Shen L., Le Fevre O., Wu P.-F., Kocevski D.D., Mei S.,
Squires G.K.
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ADC_Keywords: Galaxies, IR ; Galaxies, optical ; Spectroscopy ; Redshifts

Keywords: galaxies: clusters: general - galaxies: evolution -
galaxies: groups: general - galaxies: high-redshift -
techniques: spectroscopic - techniques: photometric

Abstract:
The Observations of Redshift Evolution in Large-Scale Environments (ORELSE) survey is an ongoing imaging and spectroscopic campaign initially designed to study the effects of environment on galaxy evolution in high-redshift (z~1) large-scale structures. We use its rich data in combination with a powerful new technique, Voronoi tessellation Monte-Carlo (VMC) mapping, to search for serendipitous galaxy overdensities at 0.55<z<1.37 within 15 ORELSE fields, a combined spectroscopic footprint of ~1.4 square degrees. Through extensive tests with both observational data and our own mock galaxy catalogs, we optimize the method's many free parameters to maximize its efficacy for general overdensity searches. Our overdensity search yielded 402 new overdensity candidates with precisely measured redshifts and an unprecedented sensitivity down to low total overdensity masses ($M_{tot}>5*10^{13}M_{\odot}$). Using the mock catalogs, we estimated the purity and completeness of our overdensity catalog as a function of redshift, total mass, and spectroscopic redshift fraction, finding impressive levels of both 0.92/0.83 and 0.60/0.49 for purity/completeness at z=0.8 and z=1.2, respectively, for all overdensity masses at spectroscopic fractions of ~20%. With VMC mapping, we are able to measure precise systemic redshifts, provide an estimate of the total gravitating mass, and maintain high levels of purity and completeness at z~1 even with only moderate levels of spectroscopy. Other methods (e.g., red-sequence overdensities and hot medium reliant detections) begin to fail at similar redshifts, which attests to VMC mapping's potential to be a powerful tool for current and future wide-field galaxy evolution surveys at z~1 and beyond.

Description:
Parameters for all 402 new overdensity candidates found across 15 ORELSE fields with their redshifts, transverse positions, fitted masses, and spectroscopic fractions. The parameters given in this file are ORELSE field, field ID number, number of points used in the Gaussian fit, redshift mean and dispersion and associated errors, equatorial coordinates, estimated total mass and associated errors, and spectroscopic fraction. The candidates were cut by spectroscopic fraction such that only those with a spectroscopic fraction of 0.05 were included. All logarithms are base 10.

File Summary:

FileName	Lrecl	Records	Explanations
ReadMe	80	.	This file
candid.dat	86	402	All Overdensity Candidates found in 15 ORELSE fields

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

Bytes	Format	Units	Label	Explanations
1- 7	A7	----	Field	Name of the field the overdensity candidate is in
9- 12	I4	----	Id	ID number of the overdensity candidate in the given field
14- 15	I2	----	Points	Number of points used in the Gaussian fit, i.e., the number of redshift slices the candidate appears in
17- 22	F6.4	----	z	Mean redshift of the overdensity candidate
24- 29	F6.4	----	e_z	1 sigma redshift uncertainty
31- 36	F6.4	----	sigma	Redshift dispersion of the overdensity candidate, described by the width of the Gaussian fit
38- 43	F6.4	----	e_sigma	1 sigma redshift dispersion uncertainty
45- 53	F9.5	deg	RAdeg	Right ascension (J2000.0)
55- 62	F8.5	deg	DEdeg	Declination (J2000.0)
64- 68	F5.2	[Msun]	logMass	Total mass
70	A1	---	---	[+]
71- 74	F4.2	[Msun]	E_logMass	1 sigma positive uncertainty on logMass

```
     76  A1    ---       ---       [-]
  77- 80  F4.2  [Msun]    e_logMass  1 sigma negative uncertainty on logMass
  82- 86  F5.3  ----      SpecFrac   Fraction of spectroscopic members in
                                      overdensity candidate
```

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Denise Hung, hungd(at)hawaii.edu

(End) Denise Hung [IfA, Honolulu], Patricia Vannier [CDS] 09-Dec-2019

*The document above follows the rules of the Standard Description for Astronomical Catalogues; from this documentation it is possible to generate **f77** program to load files into arrays or line by line*