Small Scale Structure dependence on r and N

From Bluck et al. 2008: Pair fraction for extremely Massive Galaxies ($1.7 < z < 3.0$)
They adopt the convention of 30kpc as their pair distance to be in line with Patton et al. (2000) and Bundy et al. (2004). This follows rough theoretical arguments for the likelihood of a major close pair becoming a major merger in a short (~400Myr) timescale.

At z~1.6 Scale= 8.471kpc/" -> 30kpc ~ 0.001 deg -> As expected, at this scale I only recover 6 pairs, the rest are loners and no 3+, so it is probably too small to probe the scales we want.
In the figures:

- **purple, represents radius of search for each galaxy,**
- **magenta (r_inner = rsearch) represents FoF with 3+,**
- **green: FoF with 2 (r_inner = r of search),**
- **cyan (r = 2x av radius of groups) represents original groups**
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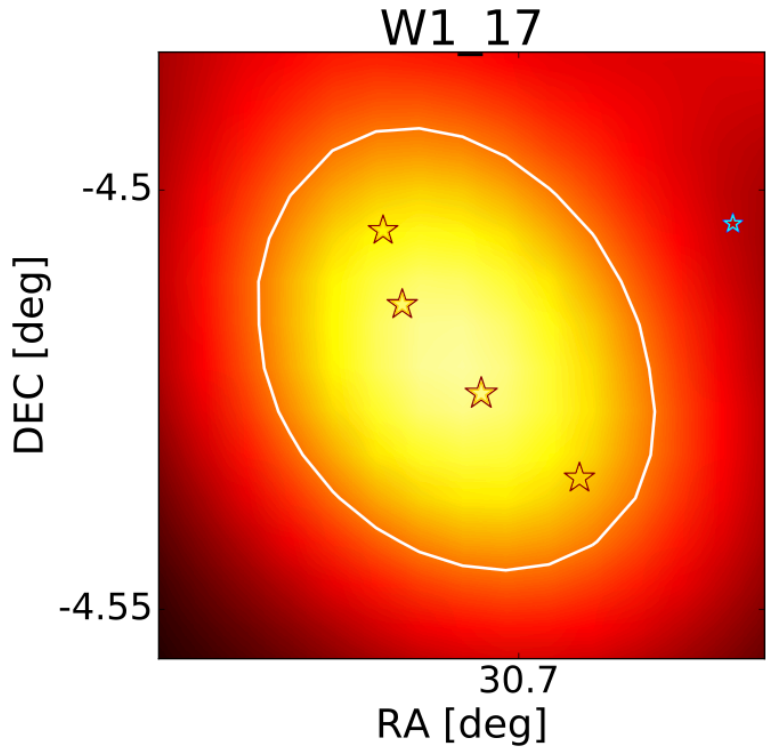
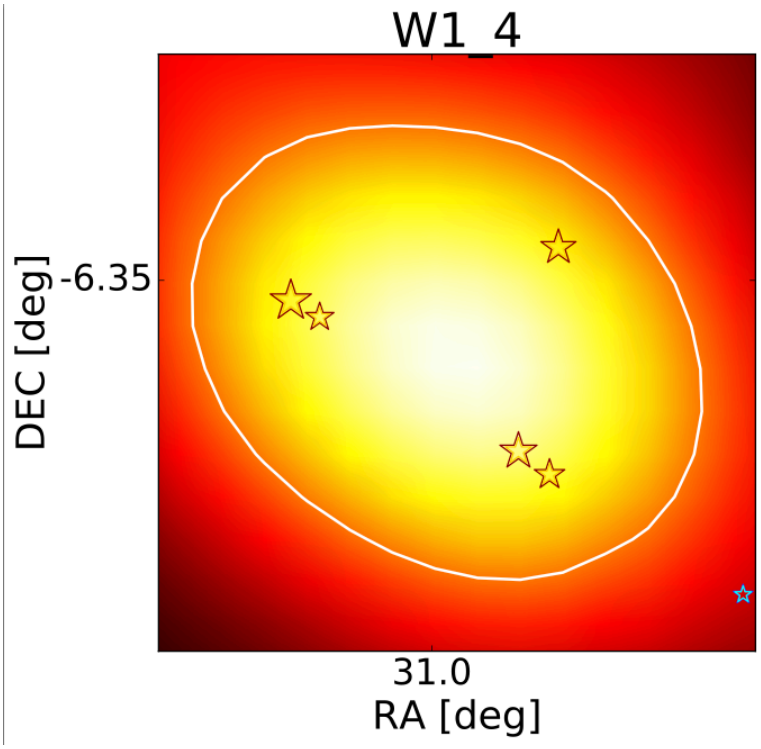
The number of groups we found in W1 is 19

So testing 4 different radii:
The av size of groups is too big: At that point we are not probing small scale clustering but pro to-clusters. Ideally, one would use diff r to find the representative # of 3+ or pairs...

r [deg]	**0.025 (av size found groups)**	**0.015**	**0.01**	**0.007 (x7 times as big as 30 physical kpc)**
N iterations	10	20	20	20
3+	23	8	4	1
2	151	116	49	34
1	1295	1400	1561	1600


W1_17
-4.5
-4.55
DEC [deg]
30.7
RA [deg]


W1_4
-6.35
DEC [deg]
31.0
RA [deg]

1. R = 0.025

It does not recover groups 12, 9,8,4,1
Complete to 3 or more
Number of original protoclusters recovered: 14 (the missing 5 were recovered as pairs, hence they will be split when shuffled)
Av. Number of protocluster formed: 32.3
Real: 32.3-14: 18.3
Percentage: 96%

For 10 iterations with dependency on linking length =
catalogs /Users/osejo/Desktop/Tesis/massivend/k_catalog/automatize/0215/environment/sfandpe/density_plots/separate_populations/gaussian/dense_fake/pr/shift_pairs/test_small_scstructure_r'+str(rsearch)+'_it'+str(i)+'.dat

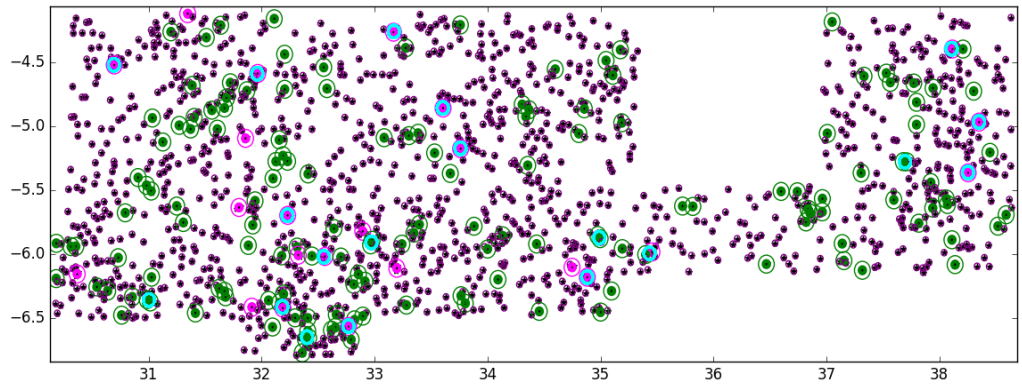
With 100 iterations

Catalogs are saved in
/Users/osejo/Desktop/Tesis/massivend/k_catalog/automatize/0215/environment/sfandpe/density_plots/separate_populations/gaussian/dense_fake/pr/shift_pairs/test_small_scstructure_it*.dat = there should be 100 iterations and all were developed with a linking length of 0.025

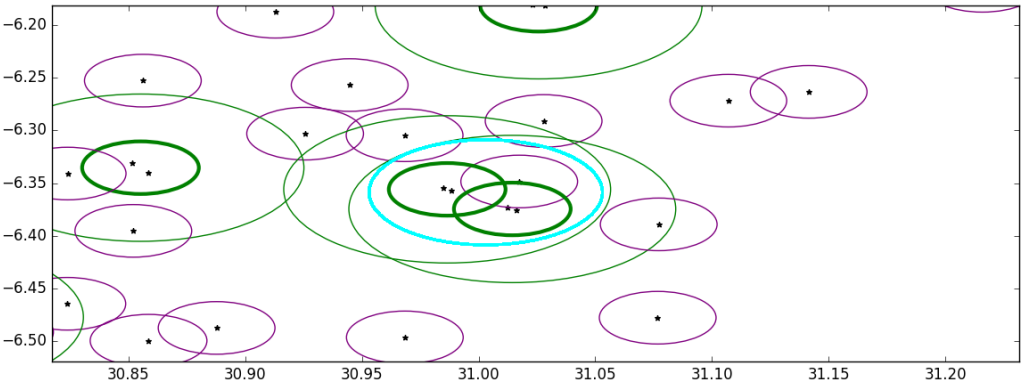
For RRR:
/Volumes/Liz/fake_env/output/whole_masks_v'+str(version)+'/'+field+'/test_fakecat_new7_w1_cluster_it'+str(i)+'_v5.dat

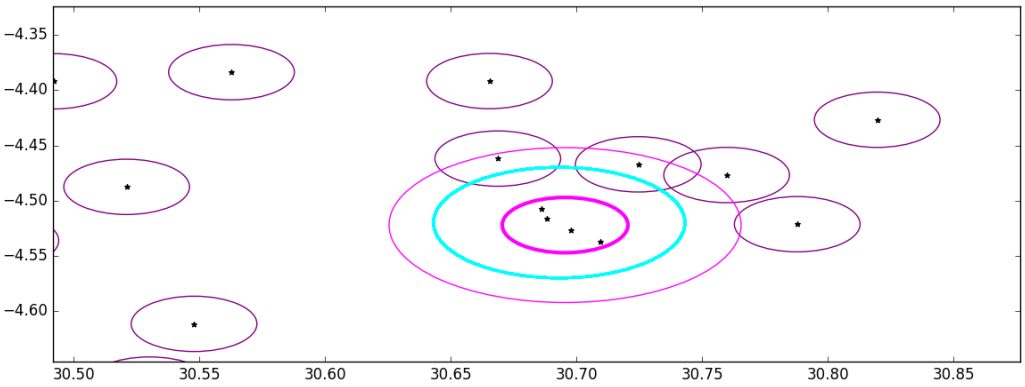
You can reproduce these numbers using output_shift_pairs.py
Complete = 3+
Av. Number of protoclusters formed: 33.67
Real: 33.67 - 14 = 19.67
Percentage: 100%

Complete = 4+
Av. Number of protoclusters formed: 19.94
Original 4+ protoclusters recovered: 7
Real: 19.94-7 = 13
Percentage: 100%



1. **Purple is the original radius of search**
2. **Dark green and magenta is the output of the FOF linking (green IDs pairs, magenta more than pairs)**
3. **Cyan shows what my heat map ID as a group**





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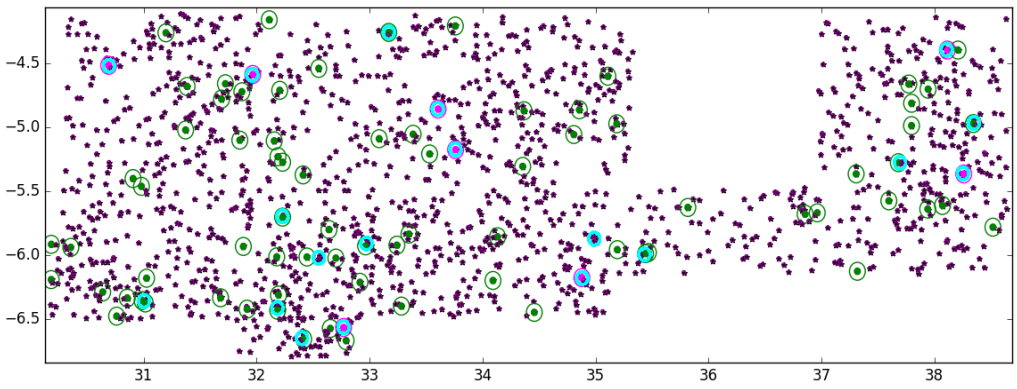
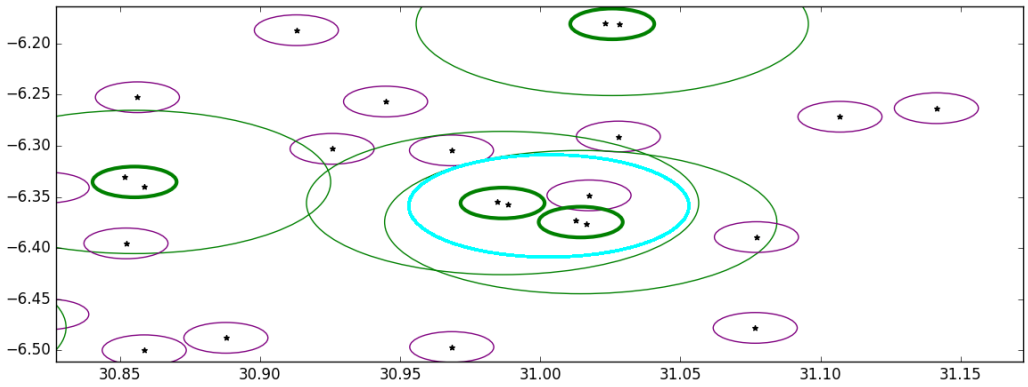
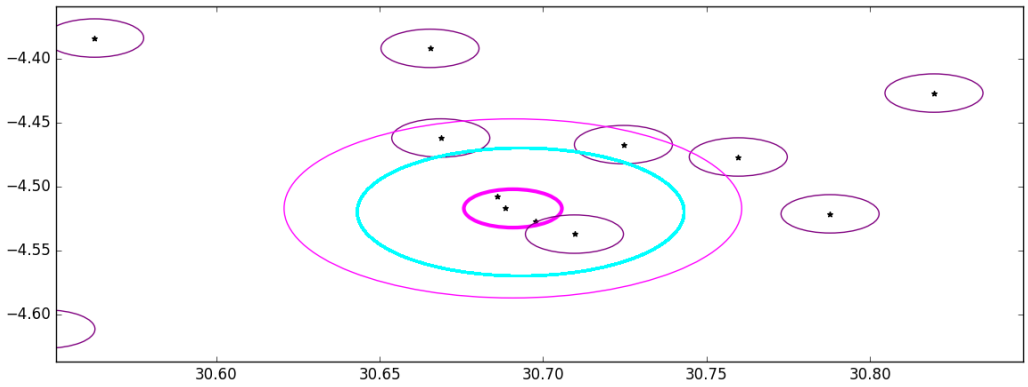
2. R = 0.015

Complete to 3 or more
Number of original protoclusters recovered: 8
Av. Number of protocluster formed:22.9 ~ 23
Real: 15
Percentage: 78%







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3. R = 0.01

Complete to 3 or more

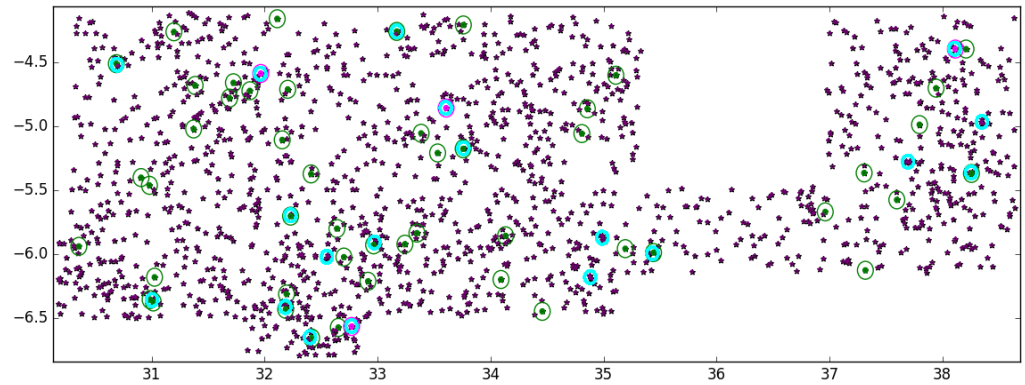
I think this size could be optimal to recover small-scale-structure. At z~1.6, it represents x10 times the distance between close pairs

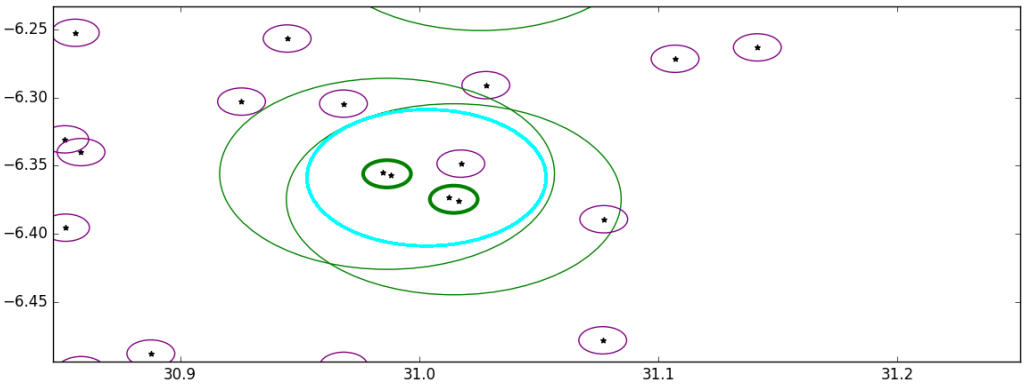
Number of original protoclusters recovered: 4

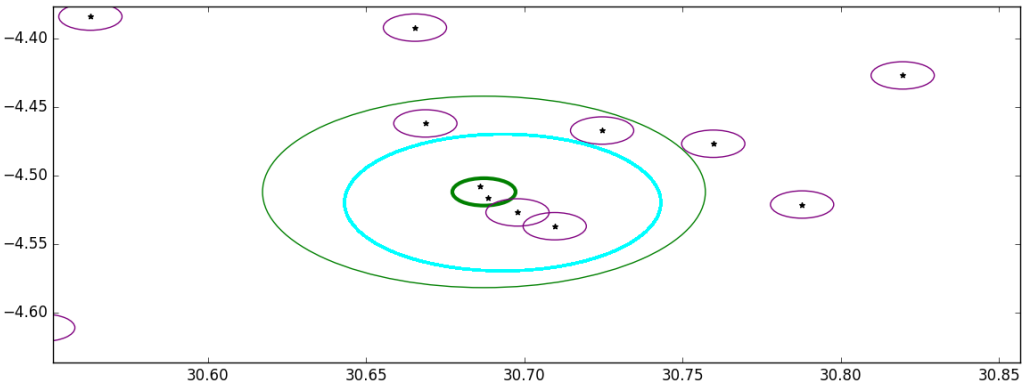
Av. Number of protocluster formed: 14.55

Real: 10.55

Percentage: 55%







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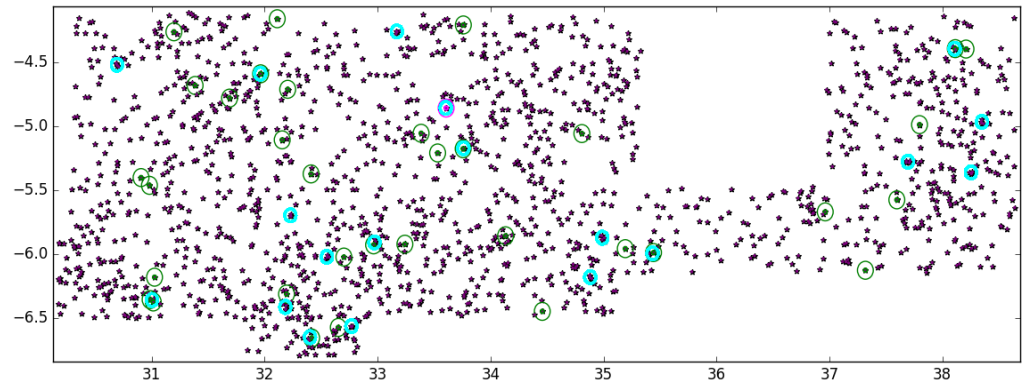
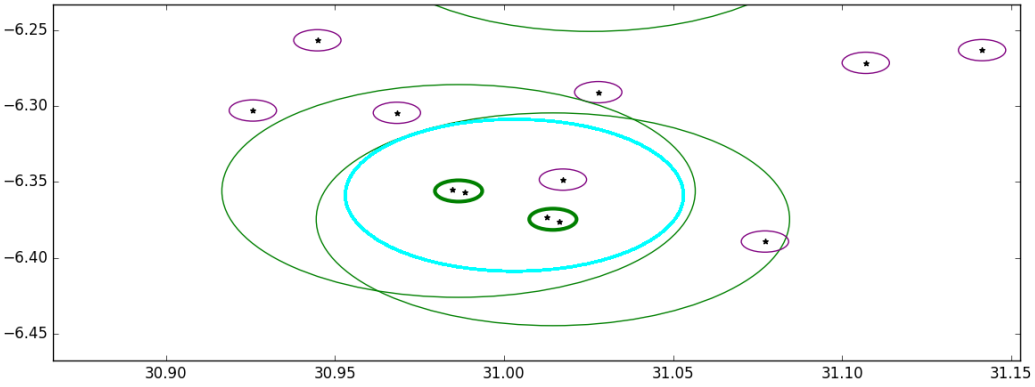
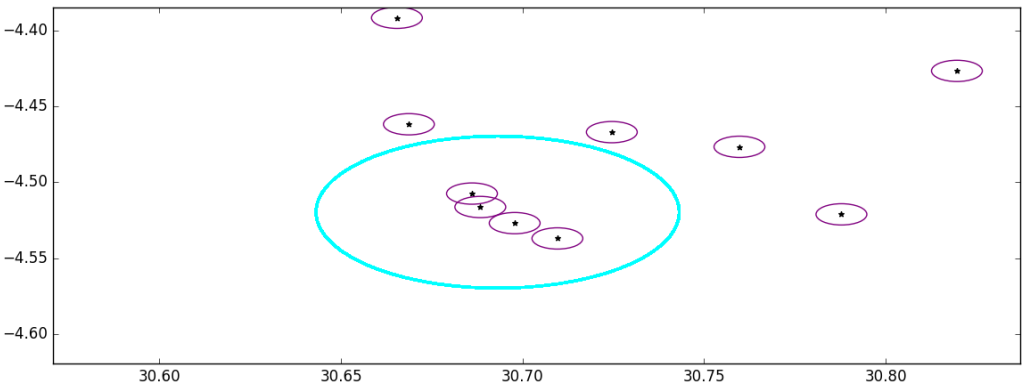
4. R = 0.007

Complete to 3 or more
Number of original protoclusters recovered: 1
Av. Number of protocluster formed: 11.85
Real : 10.85

Percentage: 57%







As before, av size of groups does not represent small scale clustering but probably x7 to x10 times the av size of close pairs can recover small scale clustering properly - more thinking required-