projected_density_maps

May 22, 2015

```
In [1]: from __future__ import (division, print_function)
```

```
In [2]: %autoreload 2
        %matplotlib inline
```

```
In [24]: %%javascript
         IPython.OutputArea.auto_scroll_threshold = 9999;
```

```
<IPython.core.display.Javascript object>
```

```
In [4]: import matplotlib.pyplot as plt
        import pandas as pd
        import h5py
```

```
In [5]: import sys
        sys.path.append("../")
        import get_gal_centroids as getg
        import plot_gal_prop as plotg
```

```
In [20]: data_f = h5py.File("../../data/Illustris-1_fof_subhalo" +
                            "_myCompleteHaloCatalog_00135.hdf5")
         h5_fstream = h5py.File("../../data/clst20_fhat.h5")
         peaks_df = pd.read_hdf("../../data/clst20_peak_df.h5", "peak_df")
```

```
In [8]: clst13 = peaks_df[peaks_df.clstNo == 13]
```

```
In [9]: metakeys = getg.metakeys()
        print(metakeys)
```

```
['clstNo', 'cut', 'weights', 'los_axis', 'xi', 'phi']
```

these are the meta data that we will group by since there are several peaks for a specific set of metadata

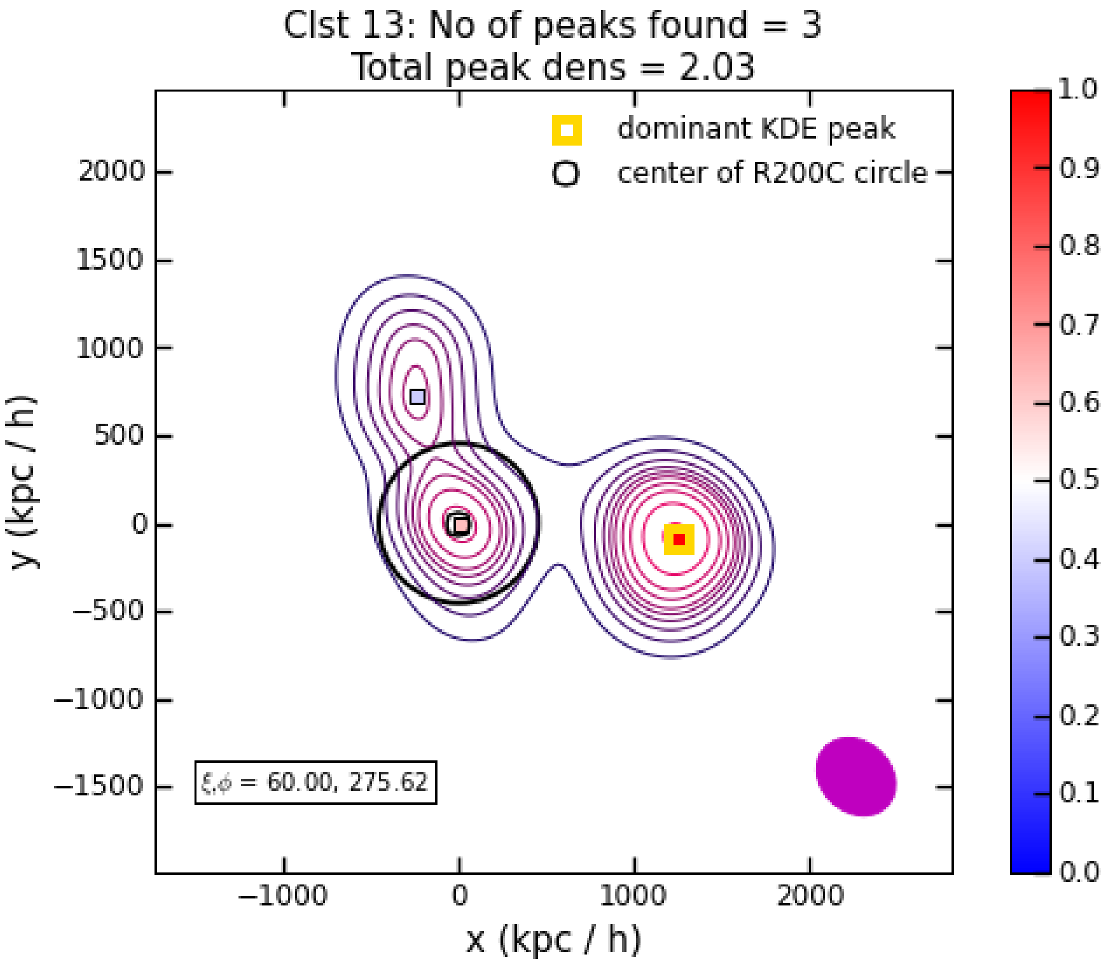
```
In [10]: gpby13 = clst13.groupby(metakeys)
         groups = dict(list(gpby13))
```

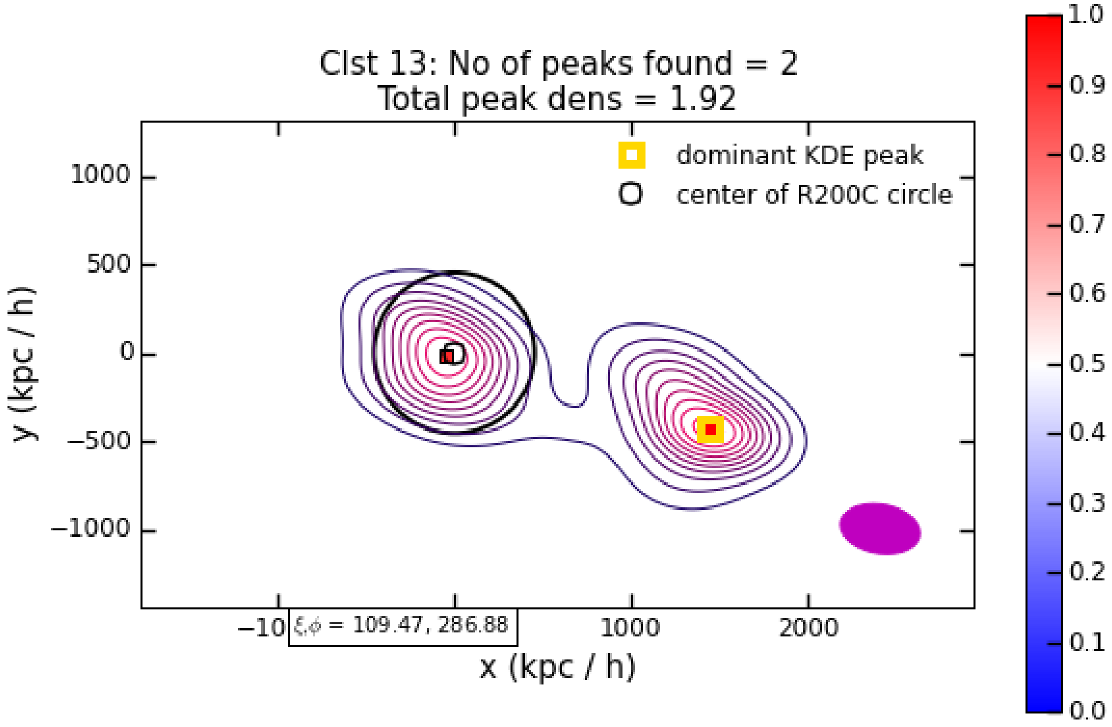
```
In [11]: fhat_dict = {gp_keys:
                      getg.retrieve_fhat_from_gp(gp_keys, gp_vals, h5_fstream)
                      for gp_keys, gp_vals in groups.iteritems()
                      }
```

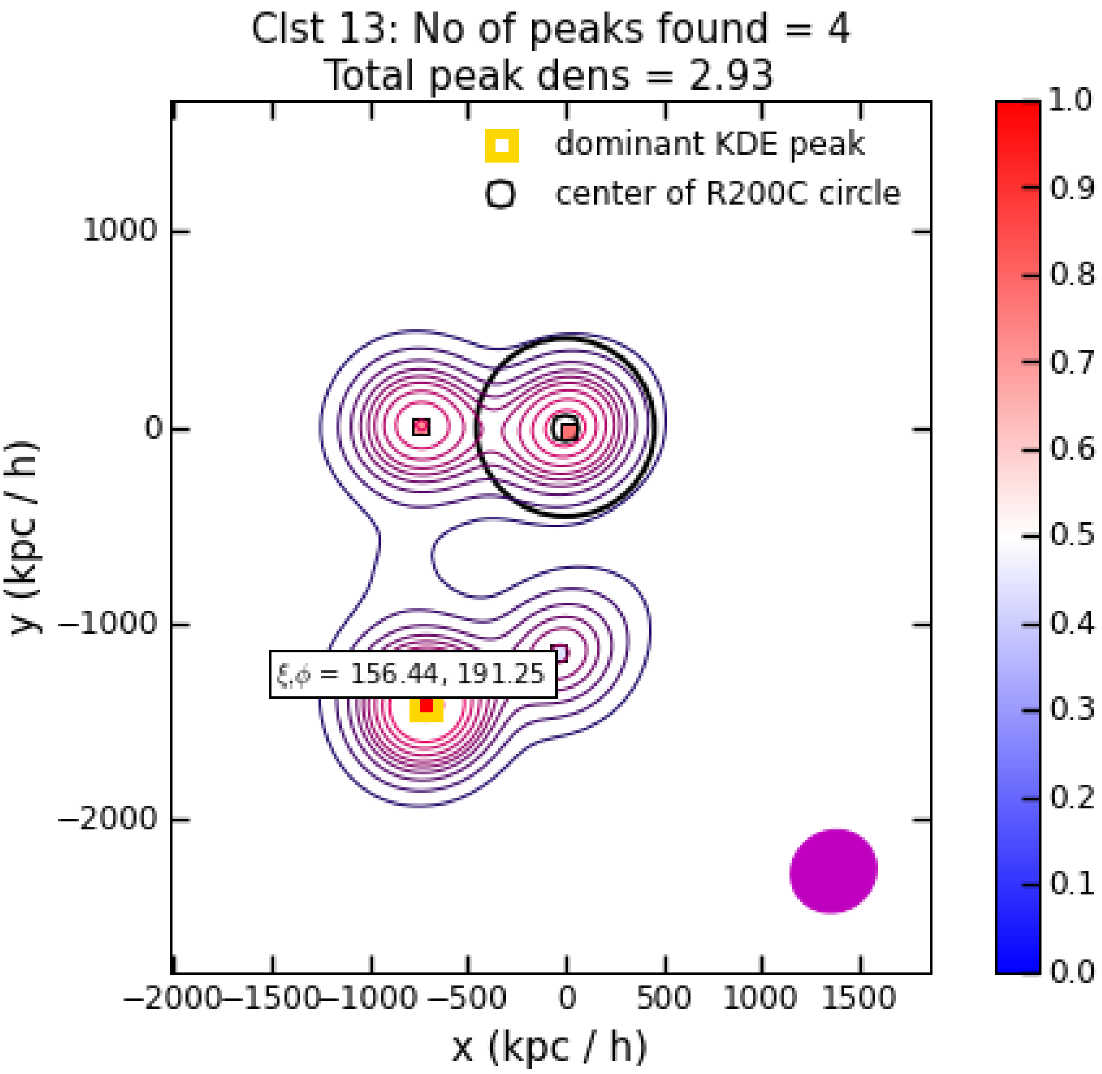
1 visualize different projections

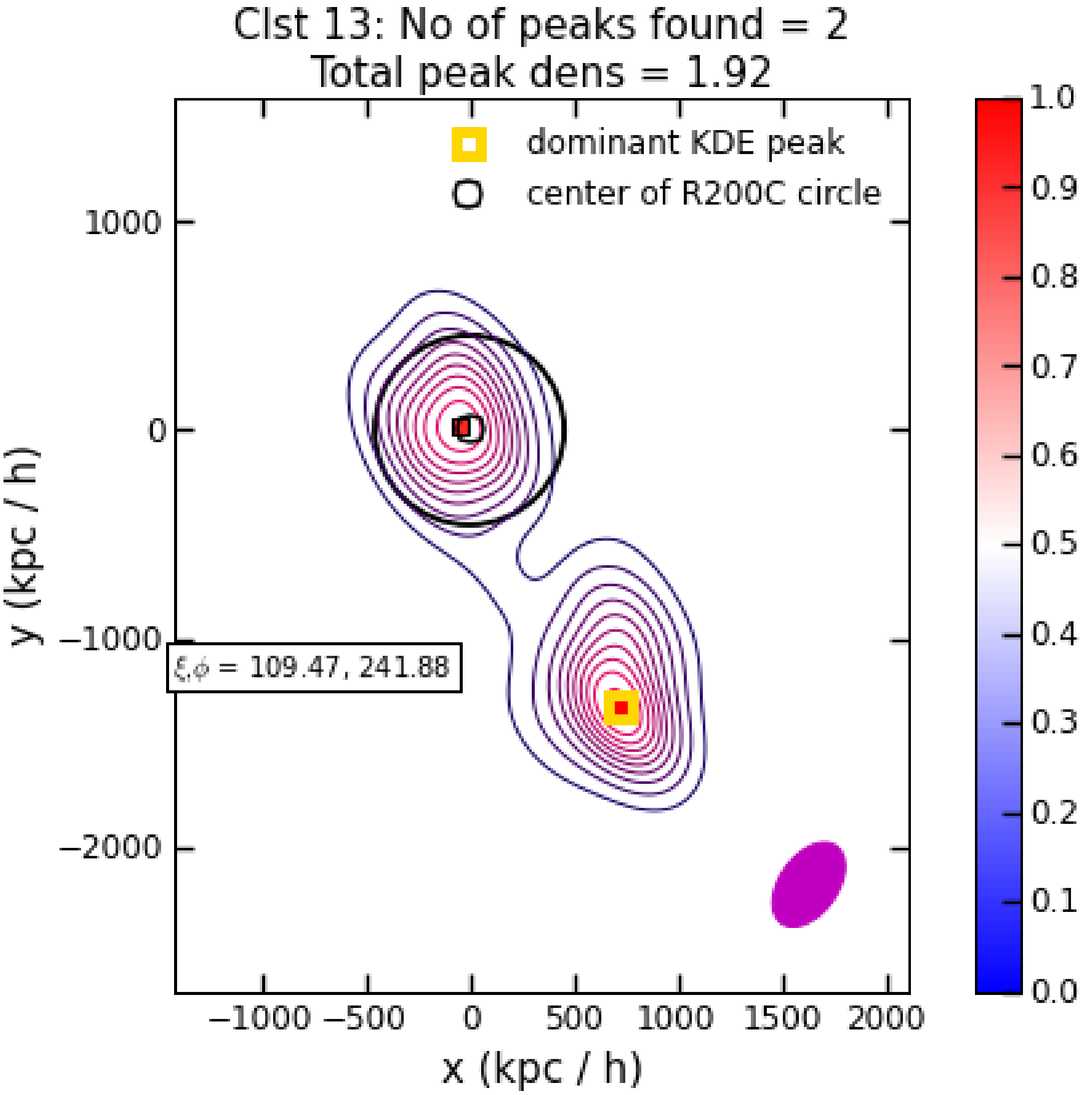
due to how the data is stored, subsequent projections shown here may not reflect if two projections are close in angular space.

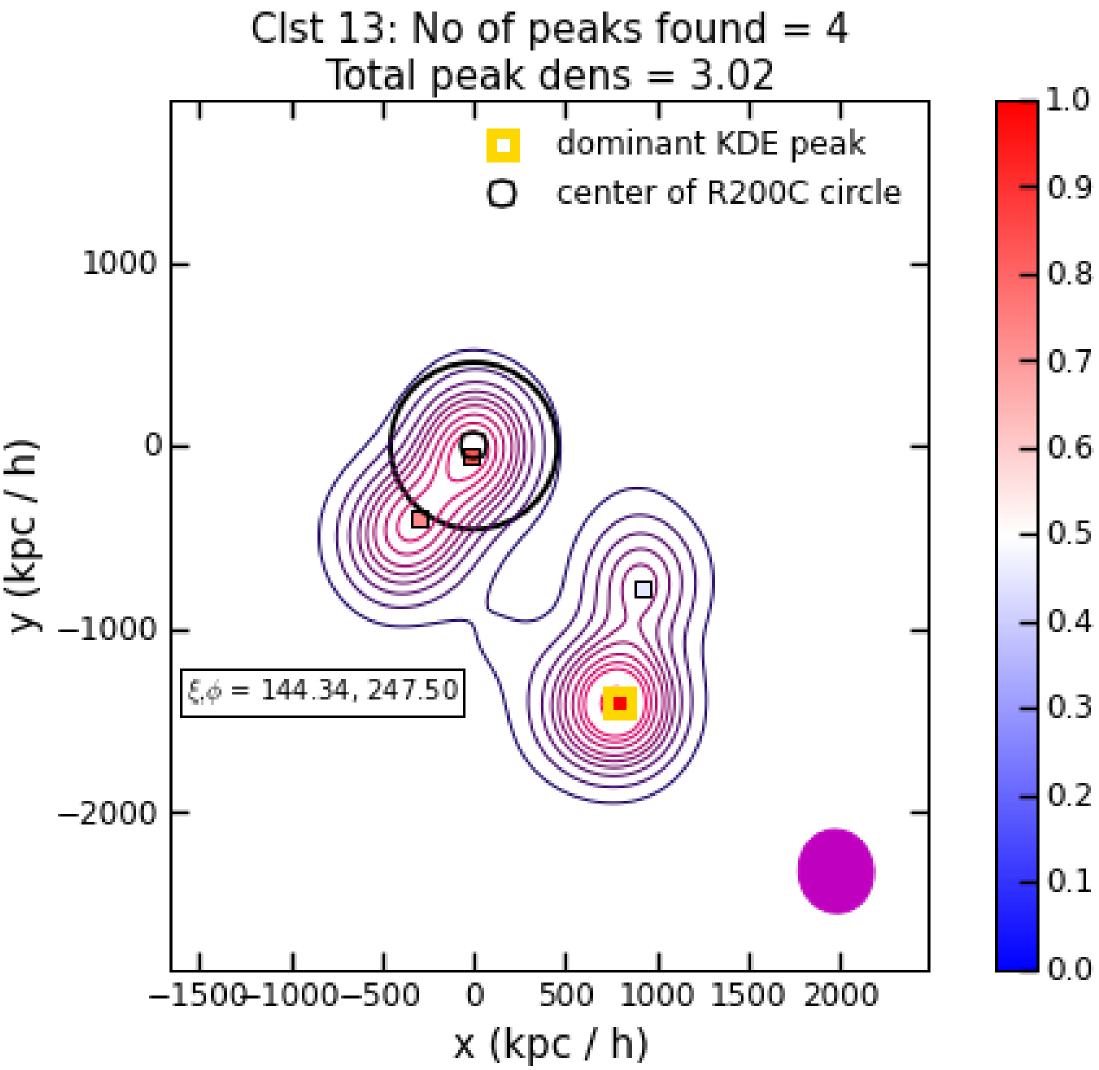
```
In [84]: for key in fhat_dict.keys()[:20]:
             clstNo = key[0]
             fig = plt.figure()

             ax = fig.add_subplot(111, aspect='equal')

             plotg.plot_KDE_peaks(fhat_dict[key],
                                  clstNo=clstNo,
                                  allPeaks=True,
                                  R200C=data_f["Group"]['Group_R_Crit200'][clstNo],
                                  ax=ax, fig=fig)
             fig.set_figheight(1.5 * fig.get_figheight())
             fig.set_figwidth(1.5 * fig.get_figwidth())

             figheight = np.abs(np.diff(ax.get_xlim()))
             figwidth = np.abs(np.diff(ax.get_ylim()))
             ax.text(-figwidth / 3., -figheight / 3.,
                     r"$\xi, \phi$ = {:.2f}, {:.2f}".format(
                     *((np.array(key[-2:]) * 180. / np.pi)), size=50)
                     , bbox=dict(facecolor='white'))
```

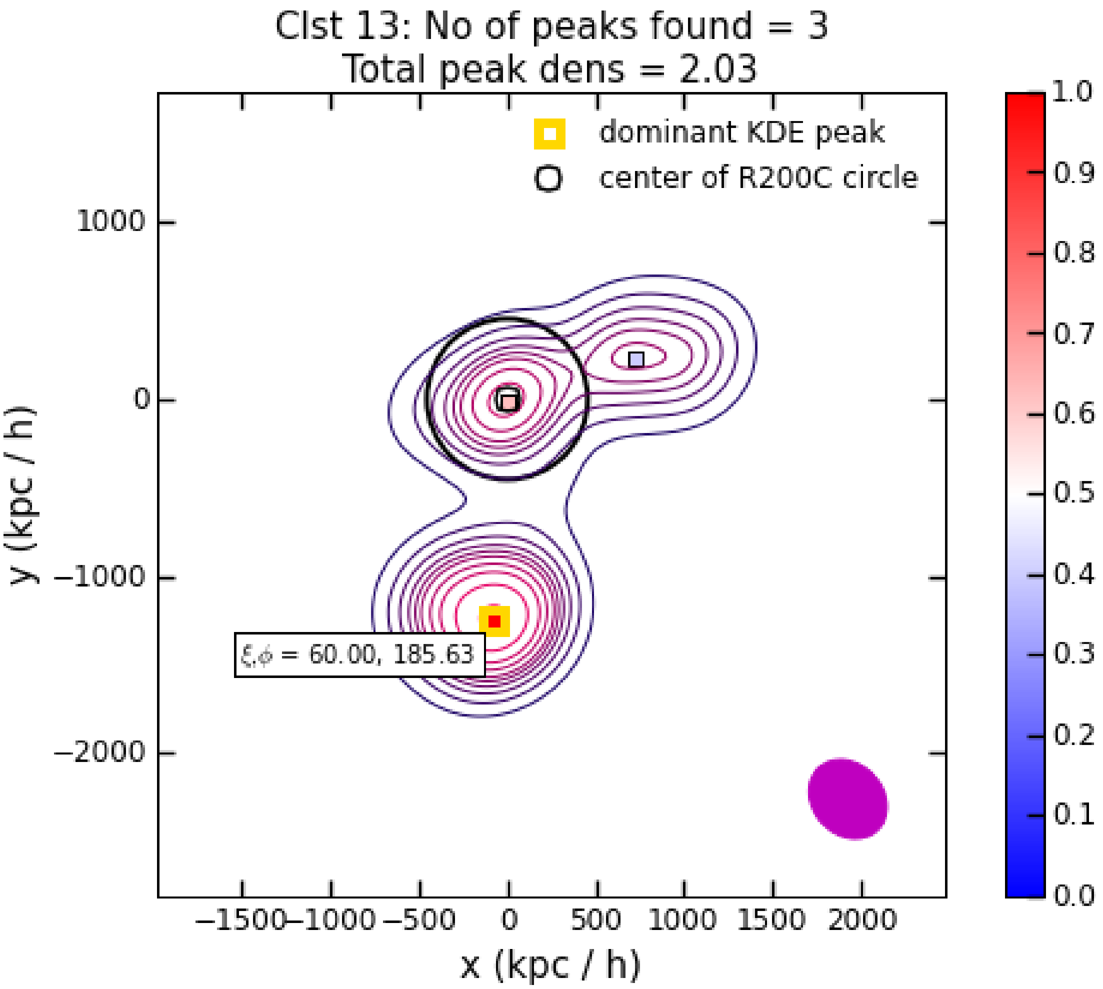

Clst 13: No of peaks found = 3
Total peak dens = 2.03
dominant KDE peak
center of R200C circle
ξ,ϕ = 60.00, 275.62
y (kpc / h)
2000
1500
1000
500
0
−500
−1000
−1500
x (kpc / h)
−1000
0
1000
2000
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0

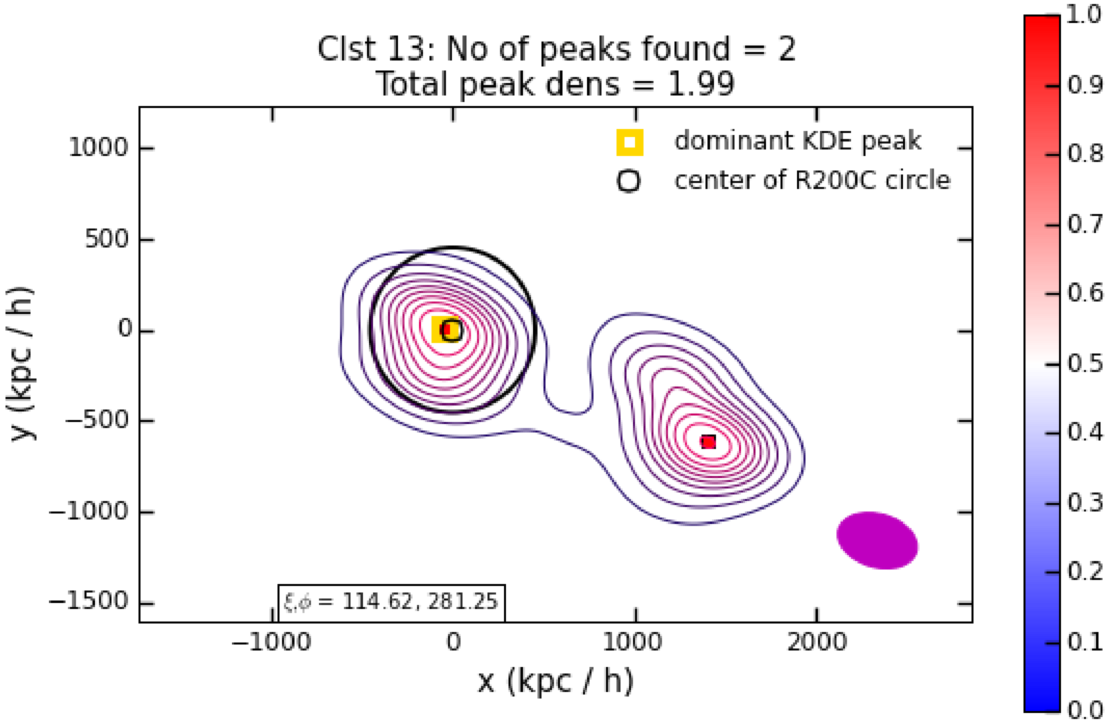

Clst 13: No of peaks found = 2
Total peak dens = 1.92
dominant KDE peak
center of R200C circle
y (kpc / h)
1000
500
0
−500
−1000
x (kpc / h)
−10
1000
2000
ξ,φ = 109.47, 286.88
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0

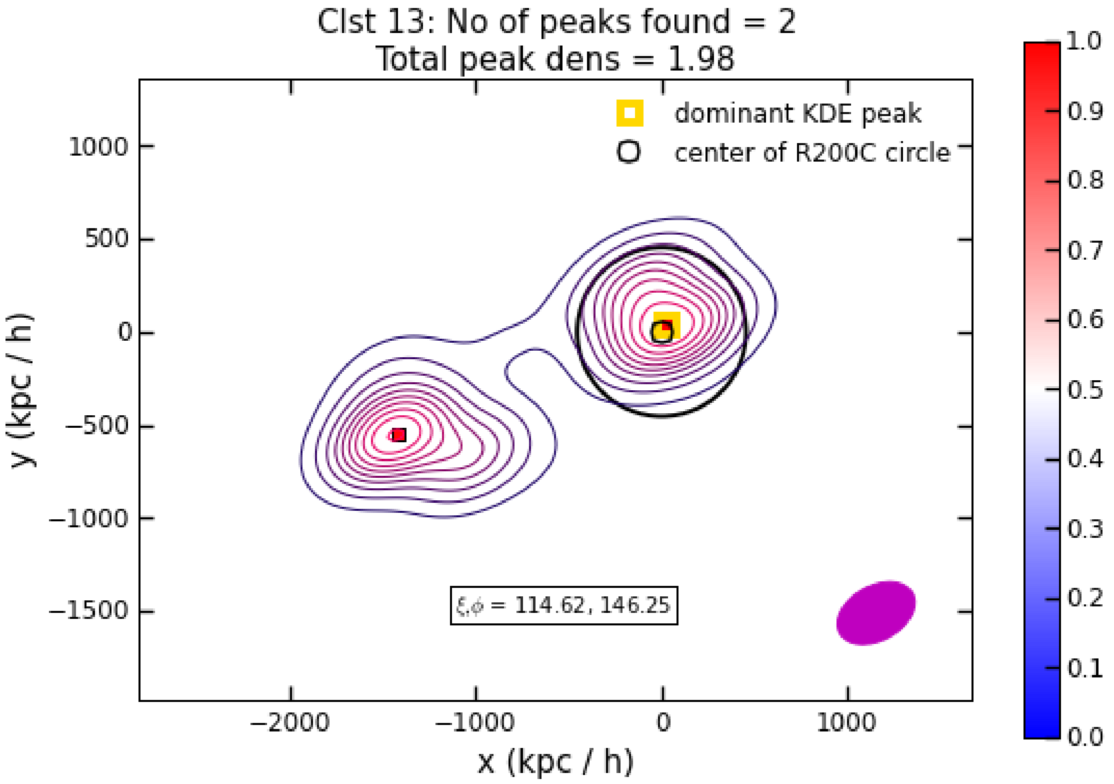

Clst 13: No of peaks found = 4
Total peak dens = 2.93
dominant KDE peak
center of R200C circle
ξ, ϕ = 156.44, 191.25
1000
0
−1000
−2000
y (kpc / h)
−2000
−1500
−1000
−500
0
500
1000
1500
x (kpc / h)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0

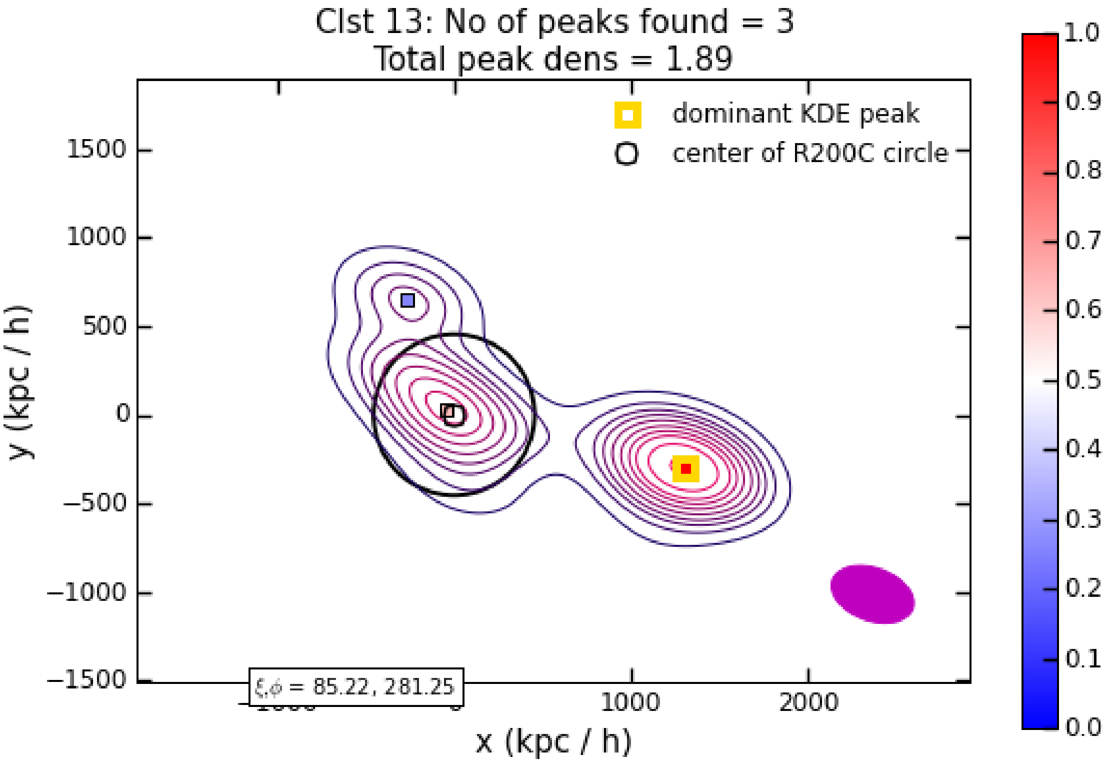

Clst 13: No of peaks found = 2
Total peak dens = 1.92
dominant KDE peak
center of R200C circle
ξ, ϕ = 109.47, 241.88
y (kpc / h)
x (kpc / h)
1000
0
−1000
−2000
−1000
−500
0
500
1000
1500
2000
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0

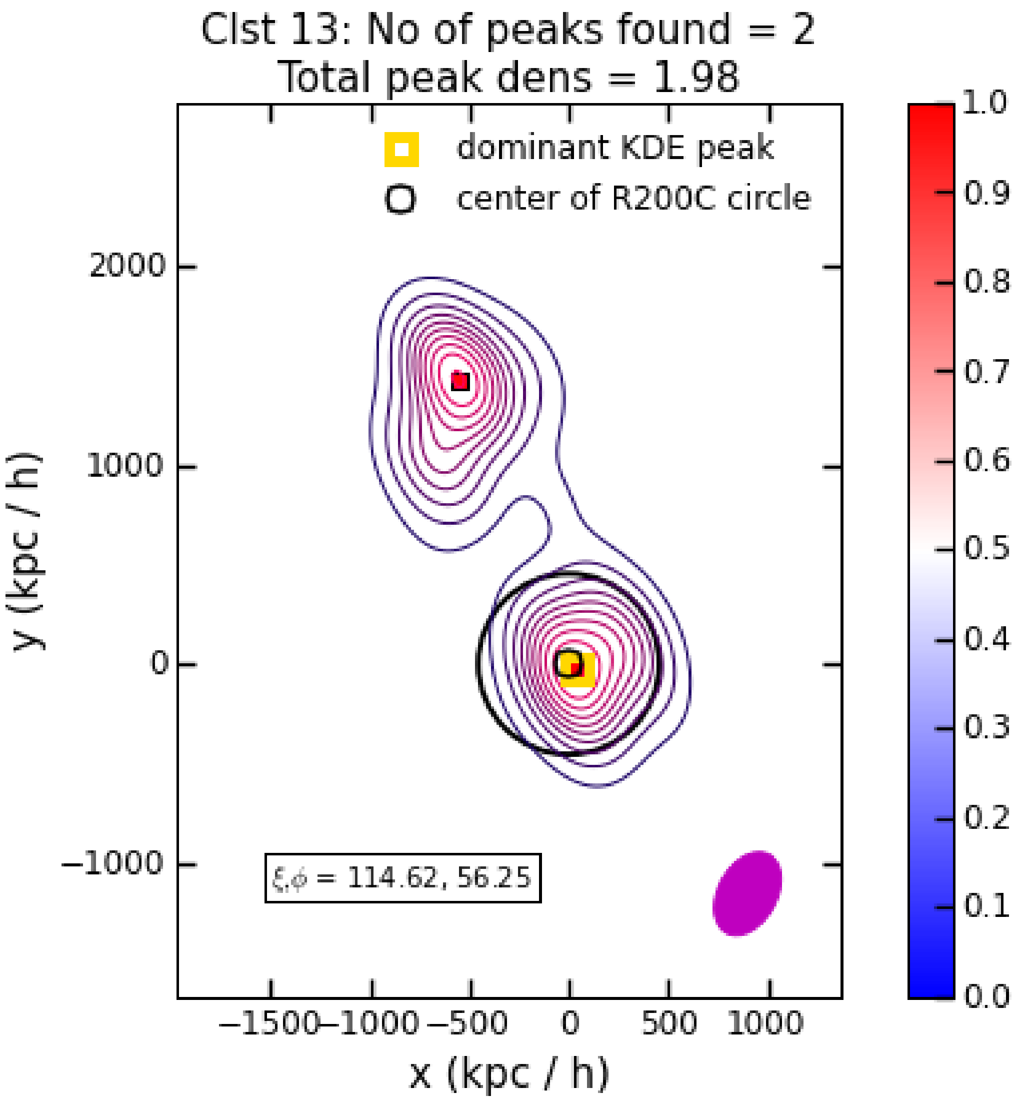

Clst 13: No of peaks found = 4
Total peak dens = 3.02
dominant KDE peak
center of R200C circle
ξ,ϕ = 144.34, 247.50
y (kpc / h)
1000
0
−1000
−2000
x (kpc / h)
−1500
−1000
−500
0
500
1000
1500
2000
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0

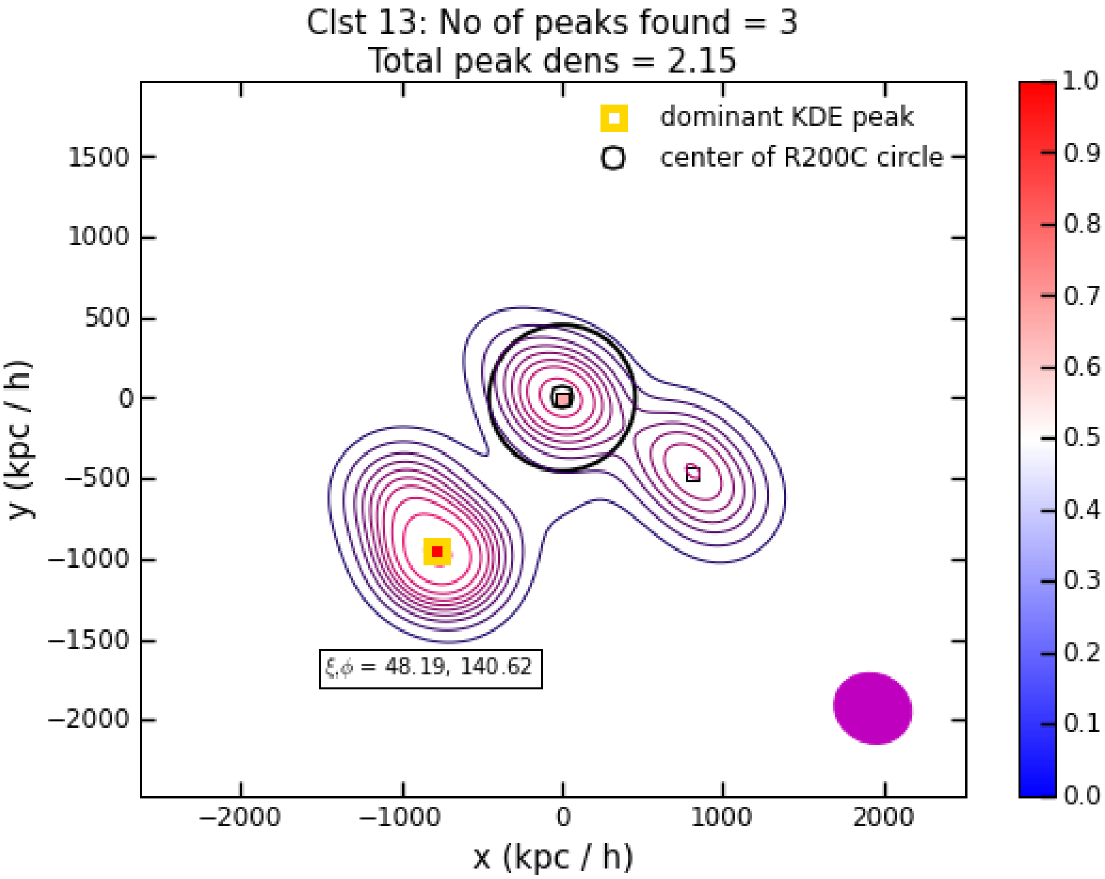

Clst 13: No of peaks found = 3
Total peak dens = 2.03
dominant KDE peak
center of R200C circle
ξ,ϕ = 60.00, 185.63
y (kpc / h)
1000
0
−1000
−2000
x (kpc / h)
−1500
−1000
−500
0
500
1000
1500
2000
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0

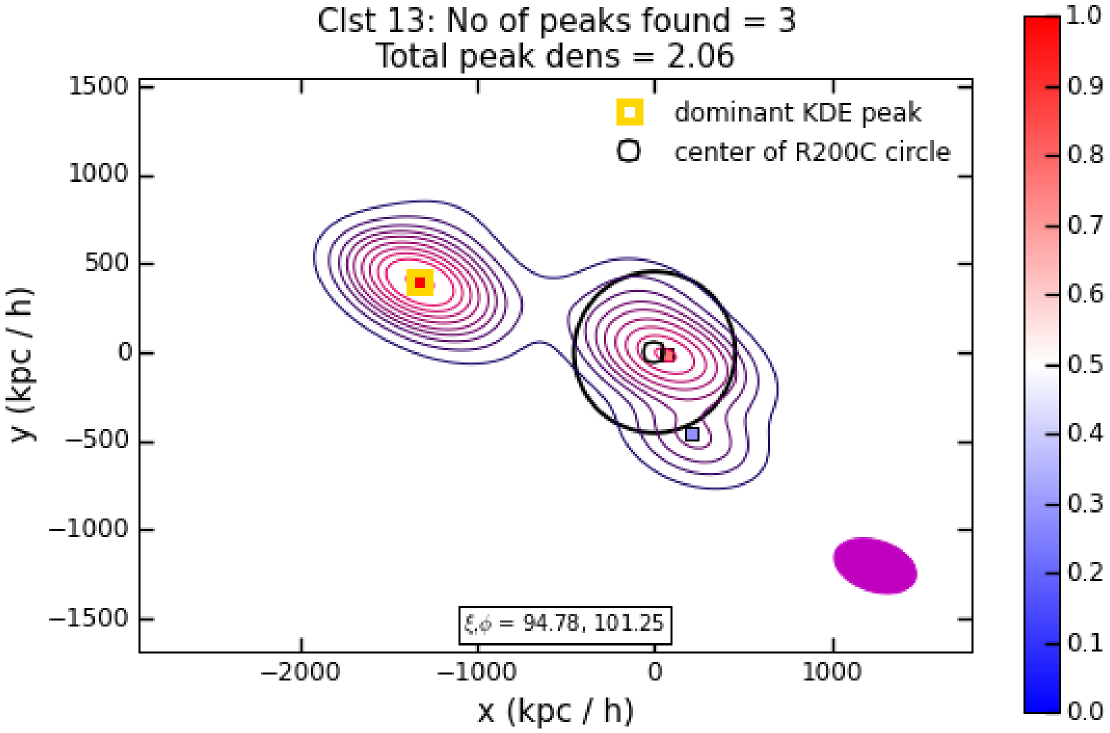

Clst 13: No of peaks found = 2
Total peak dens = 1.99
dominant KDE peak
center of R200C circle
1000
500
0
−500
−1000
−1500
y (kpc / h)
−1000
0
1000
2000
x (kpc / h)
ξ,ϕ = 114.62, 281.25
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0

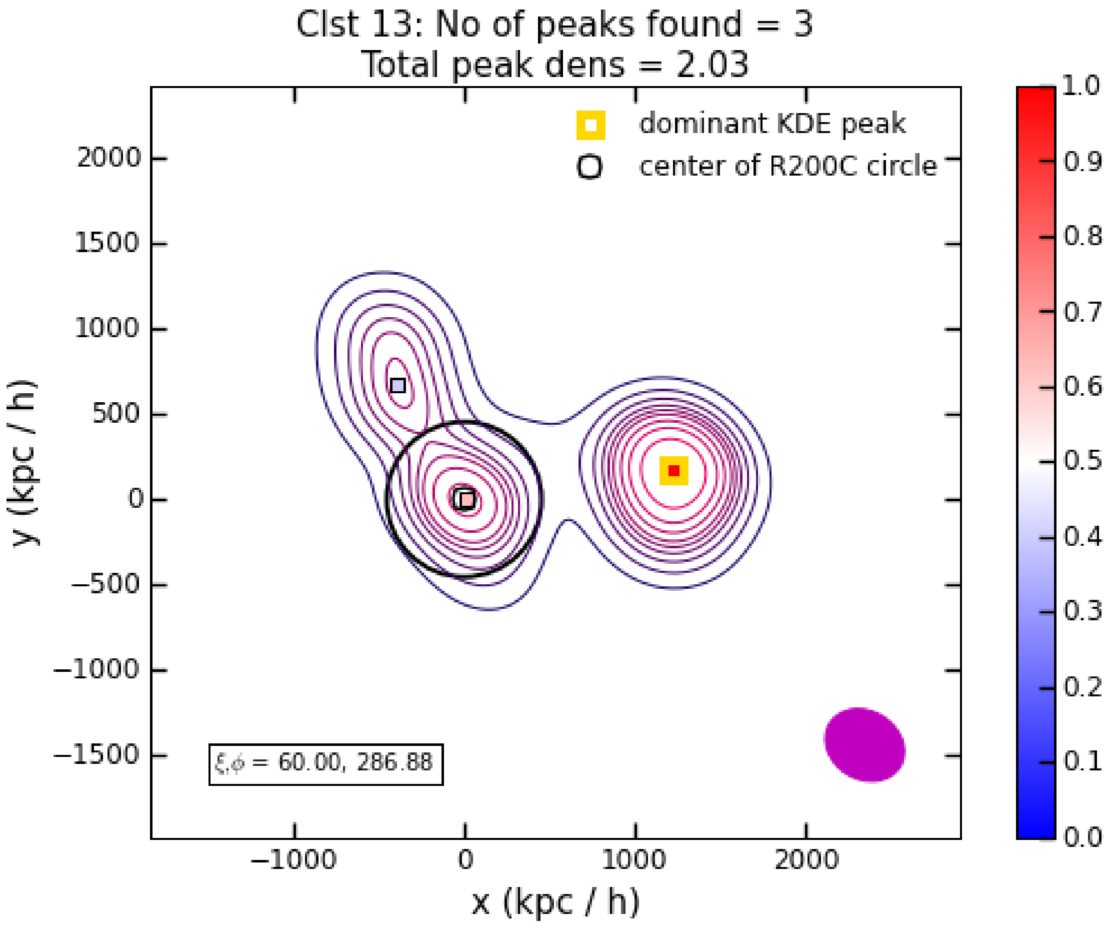

Clst 13: No of peaks found = 2
Total peak dens = 1.98
dominant KDE peak
center of R200C circle
1000
500
0
−500
−1000
−1500
y (kpc / h)
−2000
−1000
0
1000
x (kpc / h)
ξ,ϕ = 114.62, 146.25
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0

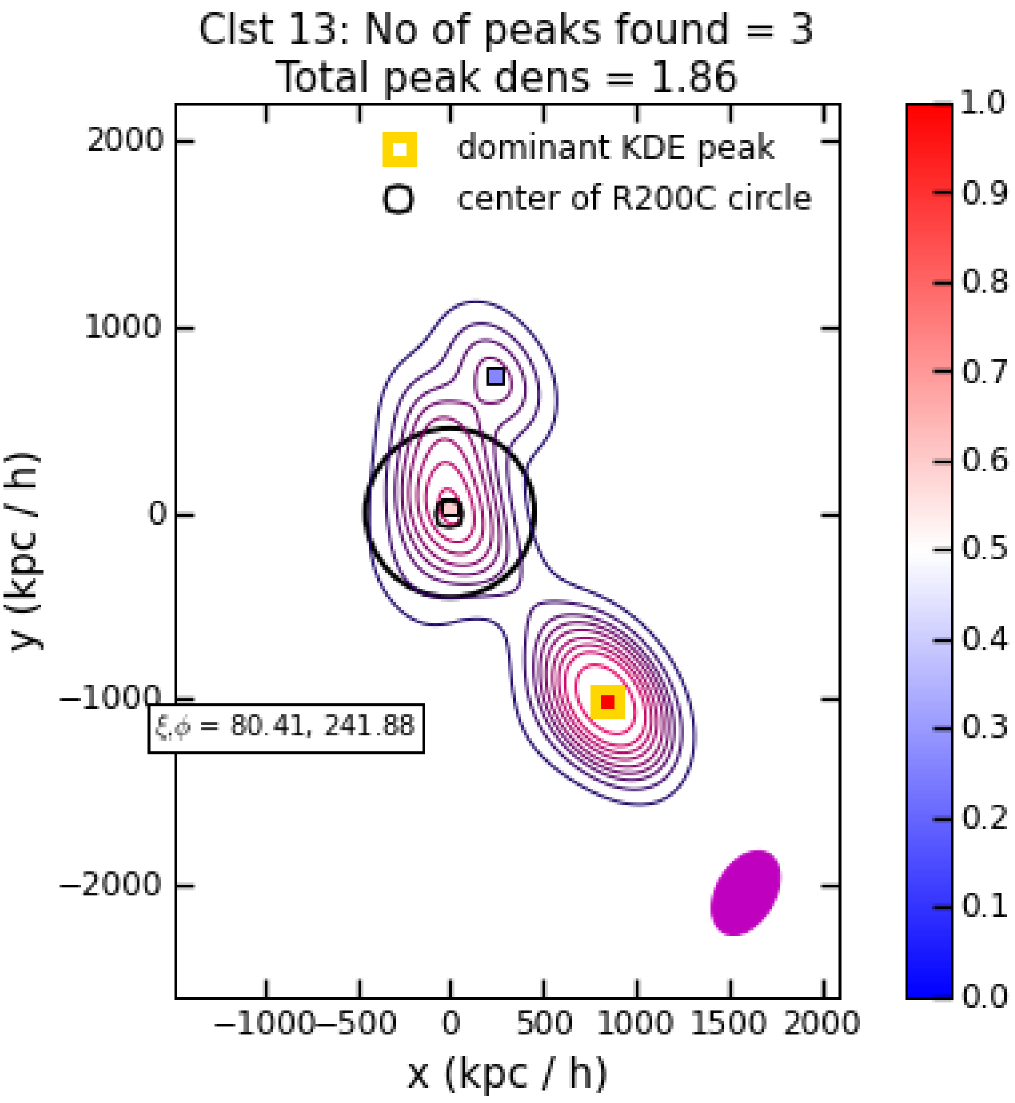

Clst 13: No of peaks found = 3
Total peak dens = 1.89
dominant KDE peak
center of R200C circle
1500
1000
500
0
−500
−1000
−1500
y (kpc / h)
1000
2000
x (kpc / h)
ξ,φ = 85.22, 281.25
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0

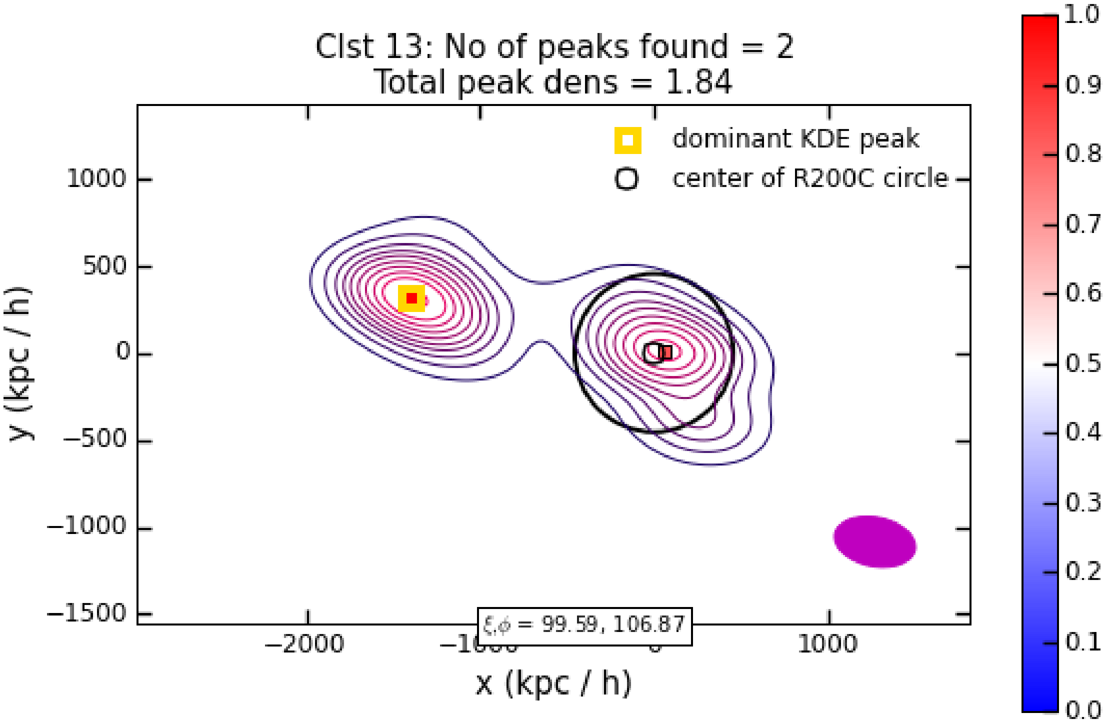

Clst 13: No of peaks found = 2
Total peak dens = 1.98
dominant KDE peak
center of R200C circle
ξ,ϕ = 114.62, 56.25
y (kpc / h)
x (kpc / h)
2000
1000
0
−1000
−1500
−1000
−500
0
500
1000
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0

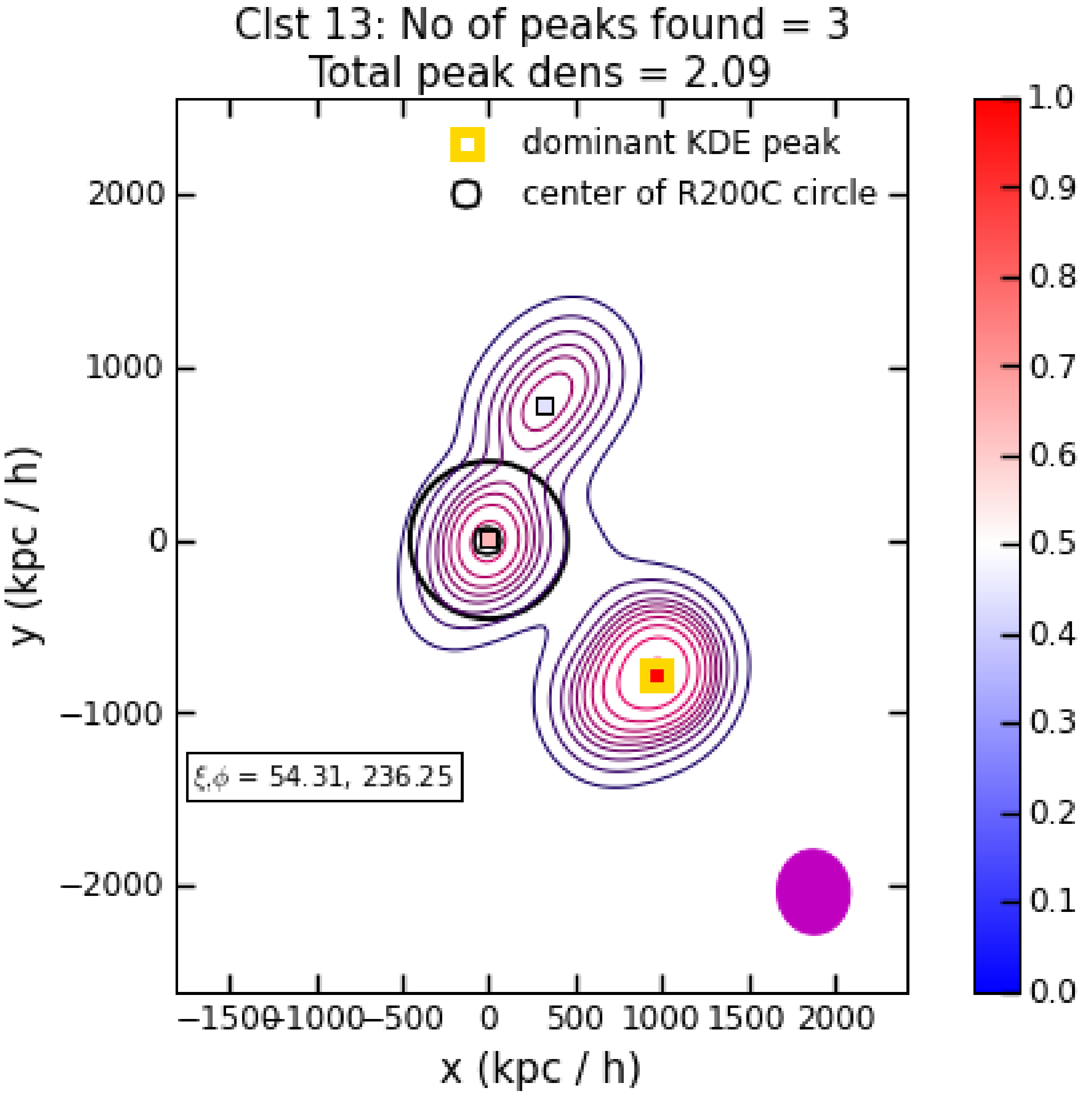

Clst 13: No of peaks found = 3
Total peak dens = 2.15
dominant KDE peak
center of R200C circle
ξ,ϕ = 48.19, 140.62
x (kpc / h)
y (kpc / h)
−2000
−1000
0
1000
2000
1500
1000
500
0
−500
−1000
−1500
−2000
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0

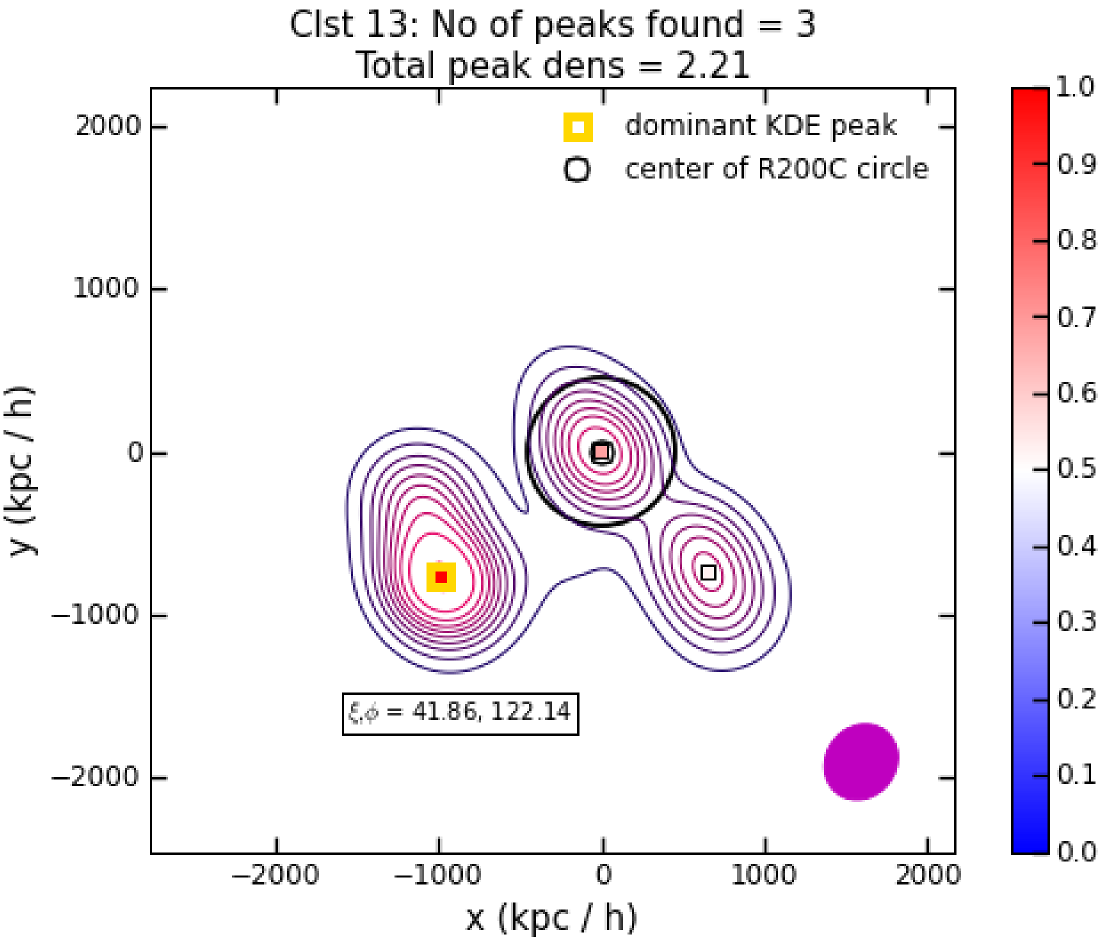

Clst 13: No of peaks found = 3
Total peak dens = 2.06
dominant KDE peak
center of R200C circle
ξ,ϕ = 94.78, 101.25
1500
1000
500
0
−500
−1000
−1500
y (kpc / h)
−2000
−1000
0
1000
x (kpc / h)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0

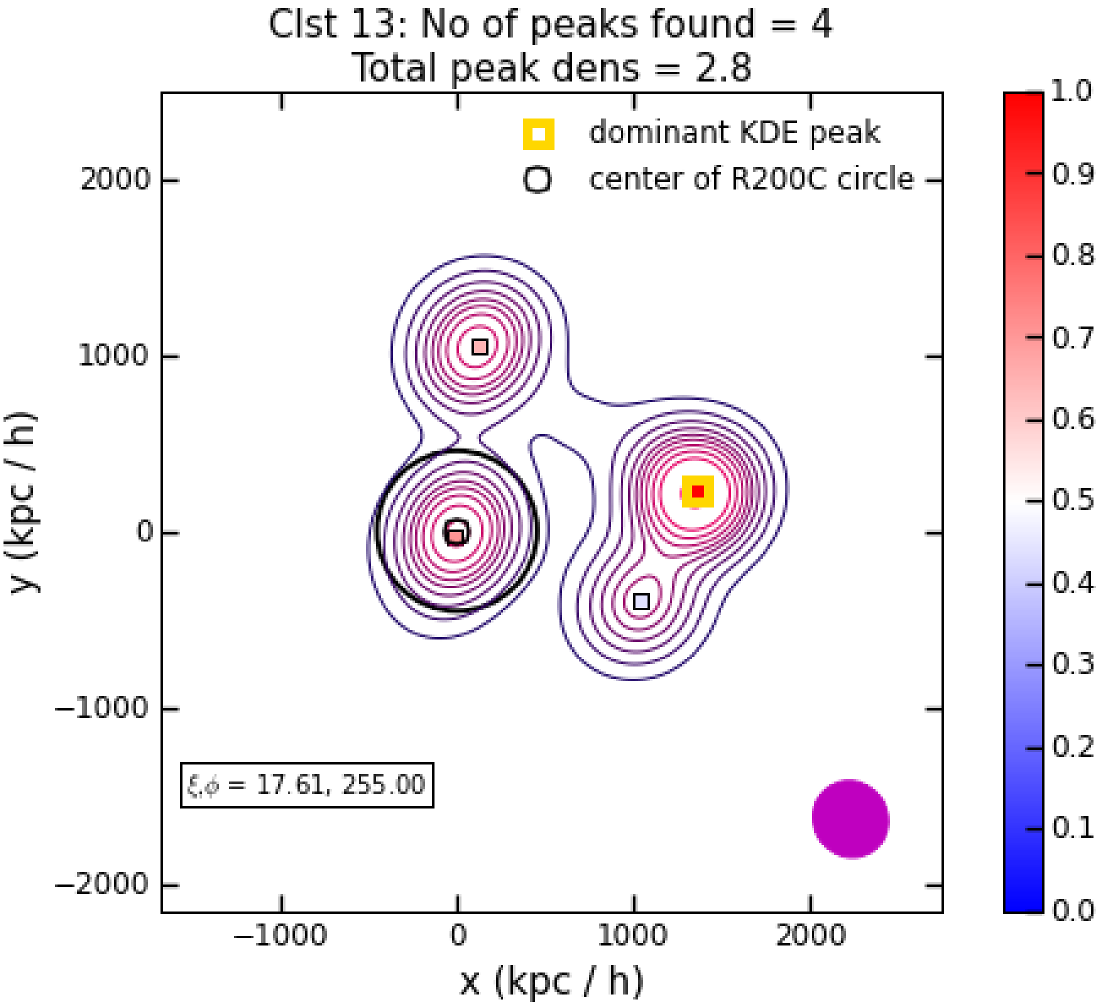

Clst 13: No of peaks found = 3
Total peak dens = 2.03
dominant KDE peak
center of R200C circle
ξ,ϕ = 60.00, 286.88
y (kpc / h)
x (kpc / h)
2000
1500
1000
500
0
−500
−1000
−1500
−1000
0
1000
2000
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0

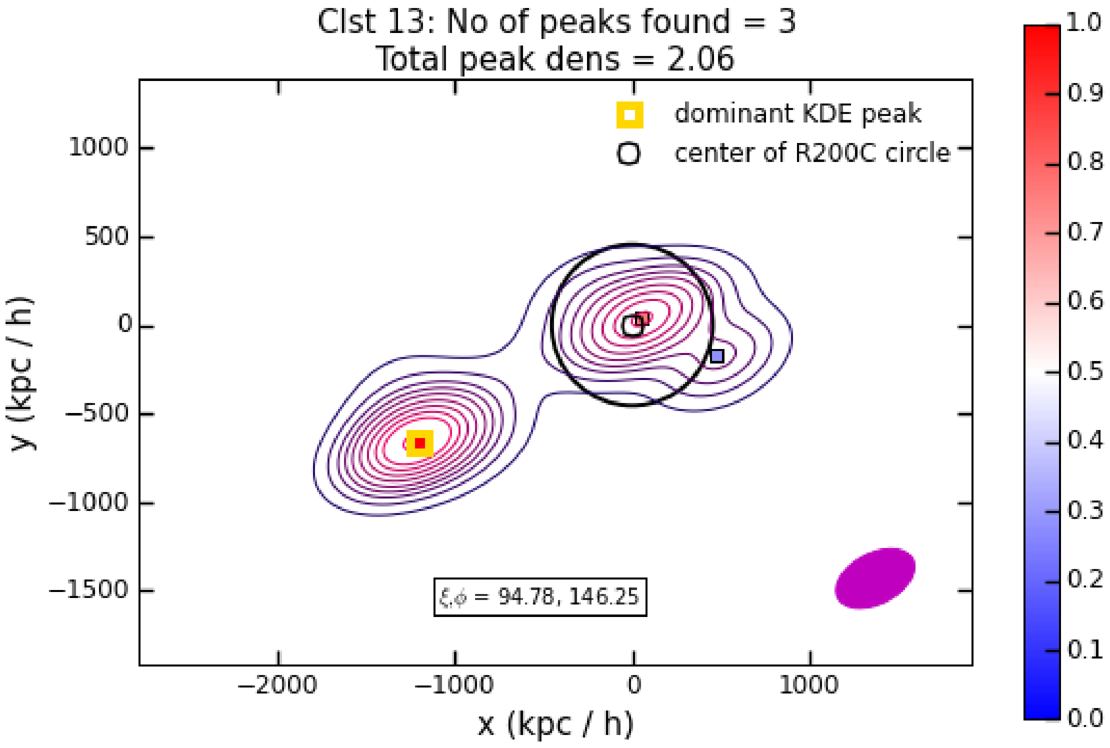

Clst 13: No of peaks found = 3
Total peak dens = 1.86
dominant KDE peak
center of R200C circle
ξ,ϕ = 80.41, 241.88
y (kpc / h)
x (kpc / h)
2000
1000
0
−1000
−2000
−1000
−500
0
500
1000
1500
2000
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0

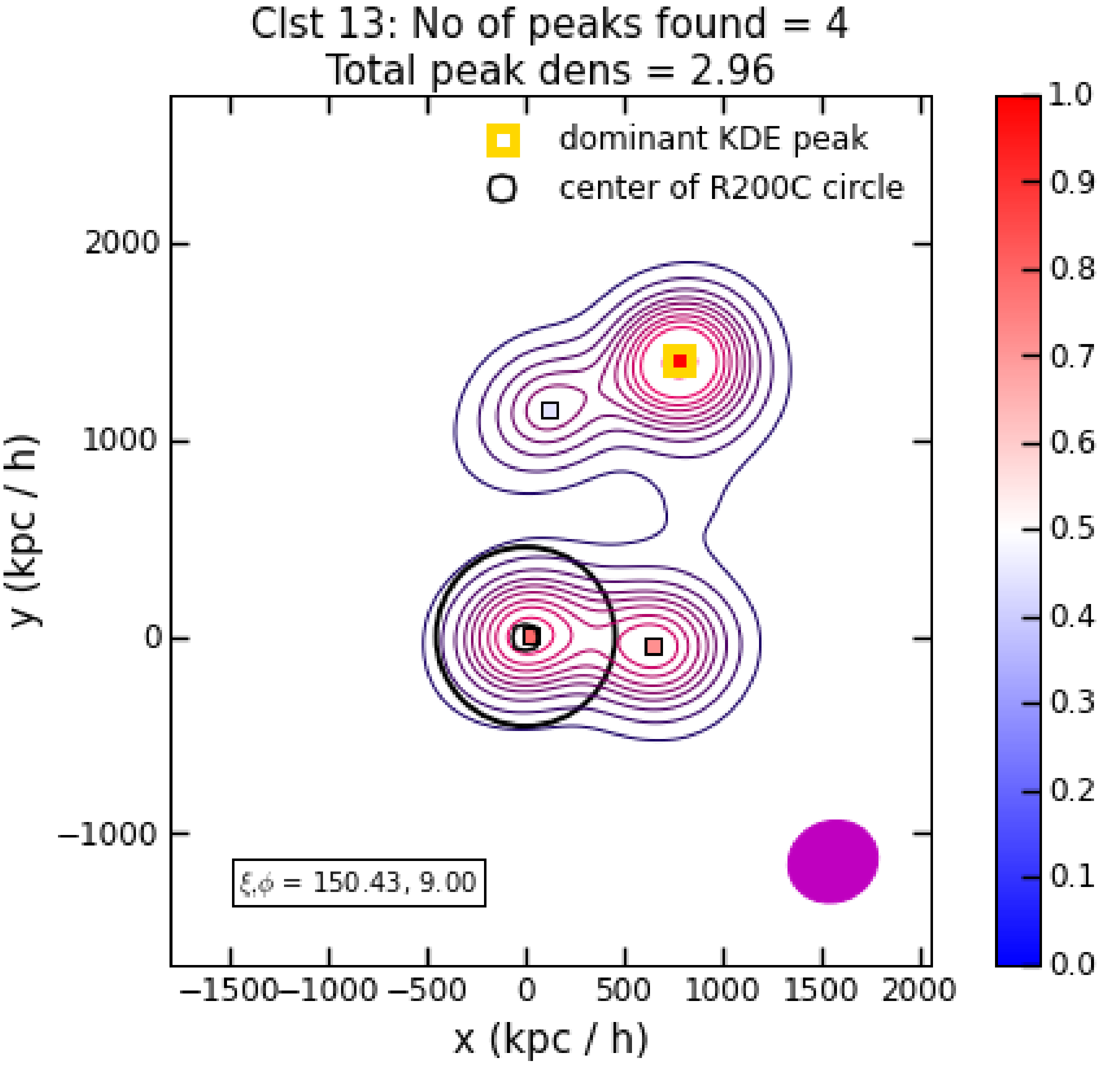

Clst 13: No of peaks found = 2
Total peak dens = 1.84
dominant KDE peak
center of R200C circle
y (kpc / h)
1000
500
0
−500
−1000
−1500
x (kpc / h)
−2000
−1000
0
1000
ξ, ϕ = 99.59, 106.87
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0


Clst 13: No of peaks found = 3
Total peak dens = 2.09
dominant KDE peak
center of R200C circle
ξ,ϕ = 54.31, 236.25
y (kpc / h)
2000
1000
0
−1000
−2000
x (kpc / h)
−1500
−1000
−500
0
500
1000
1500
2000
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0


Clst 13: No of peaks found = 3
Total peak dens = 2.21
dominant KDE peak
center of R200C circle
ξ,φ = 41.86, 122.14
y (kpc / h)
x (kpc / h)
2000
1000
0
−1000
−2000
−2000
−1000
0
1000
2000
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0


Clst 13: No of peaks found = 4
Total peak dens = 2.8
dominant KDE peak
center of R200C circle
ξ,ϕ = 17.61, 255.00
2000
1000
0
−1000
−2000
y (kpc / h)
−1000
0
1000
2000
x (kpc / h)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0


Clst 13: No of peaks found = 3
Total peak dens = 2.06
dominant KDE peak
center of R200C circle
ξ,ϕ = 94.78, 146.25
y (kpc / h)
x (kpc / h)
1000
500
0
−500
−1000
−1500
−2000
−1000
0
1000
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0


Clst 13: No of peaks found = 4
Total peak dens = 2.96
dominant KDE peak
center of R200C circle
ξ,ϕ = 150.43, 9.00
y (kpc / h)
x (kpc / h)
2000
1000
0
−1000
−1500
−1000
−500
0
500
1000
1500
2000
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0