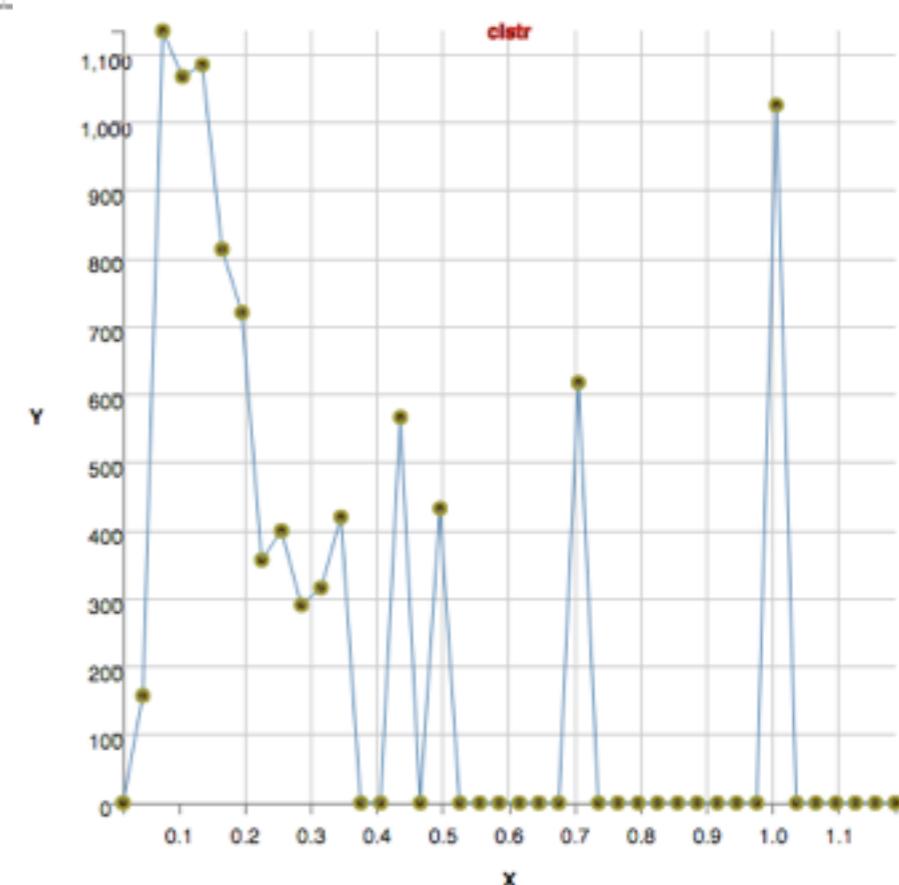
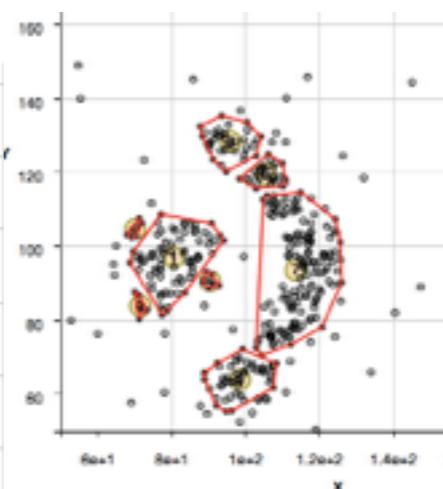
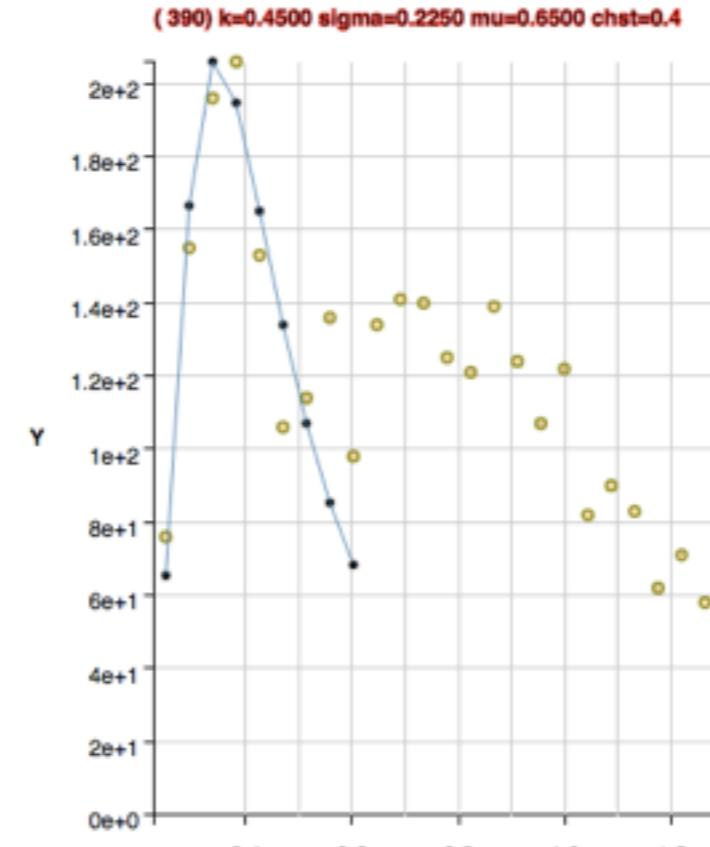
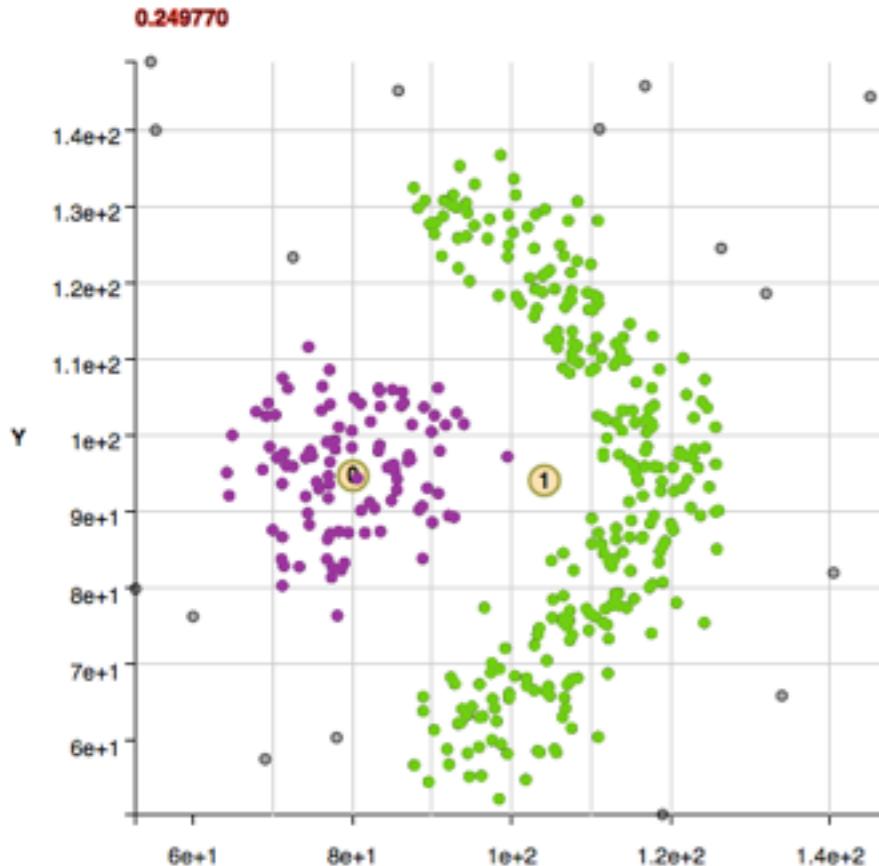


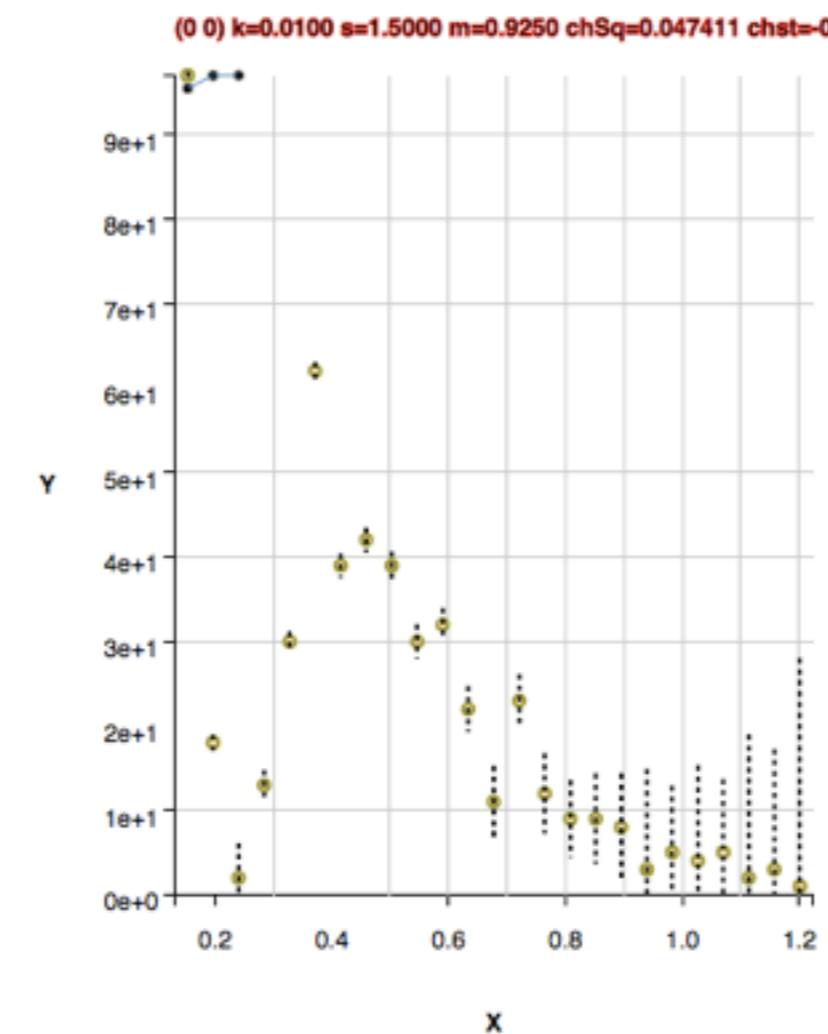
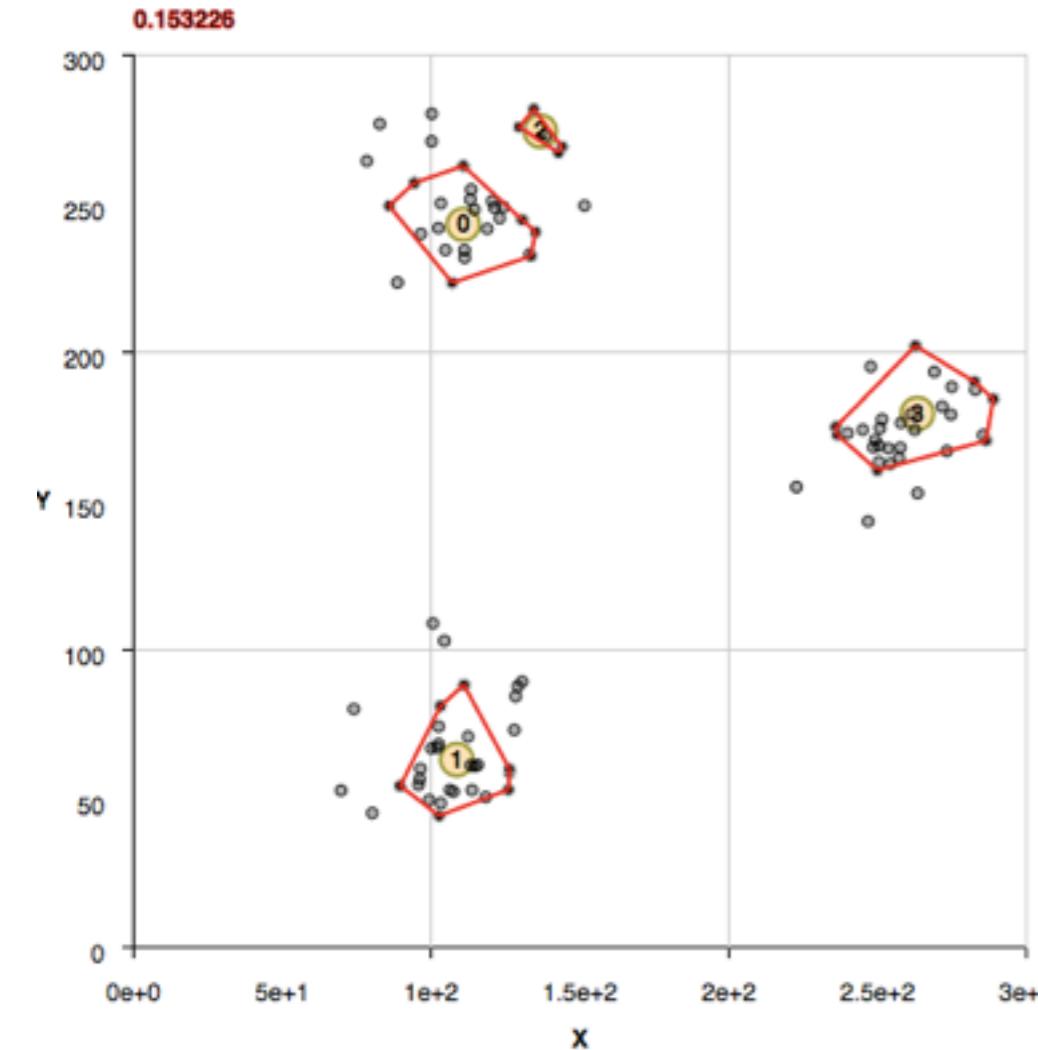
A look at using distance transforms (which are  $O(N)$  where  $N$  is the number of pixels in image instead of  $O(N^2)$  where  $N$  is the number of data points) to learn the critical density for clustering as opposed to the current methods of using the 2-point void distribution and fitting a GEV to the peak distribution.

The two-point correlation with void sep distr and GEV fit to determine critical density for clustering (by location only in this data set):

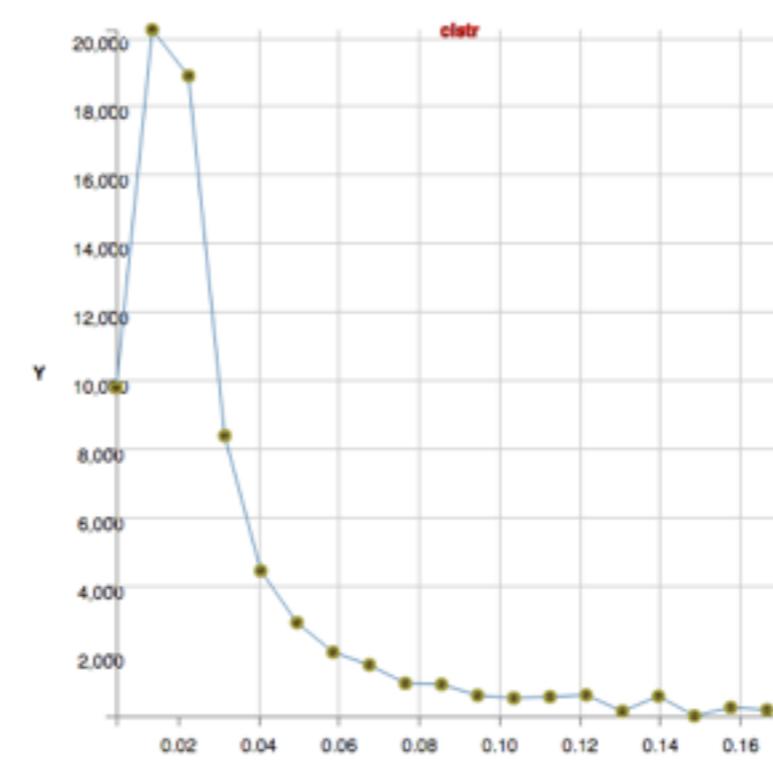
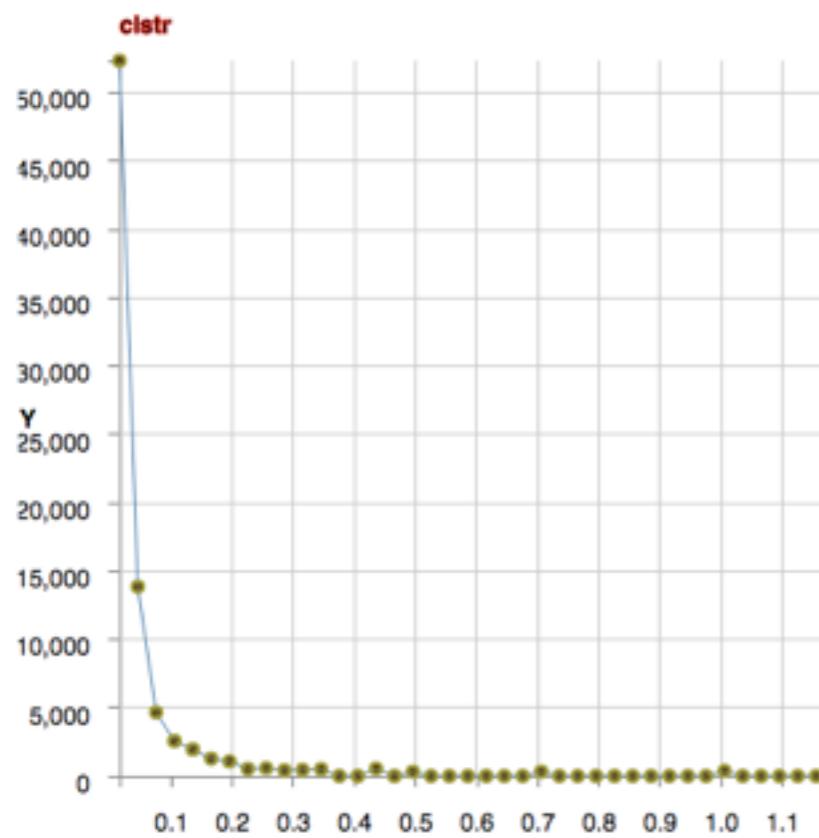


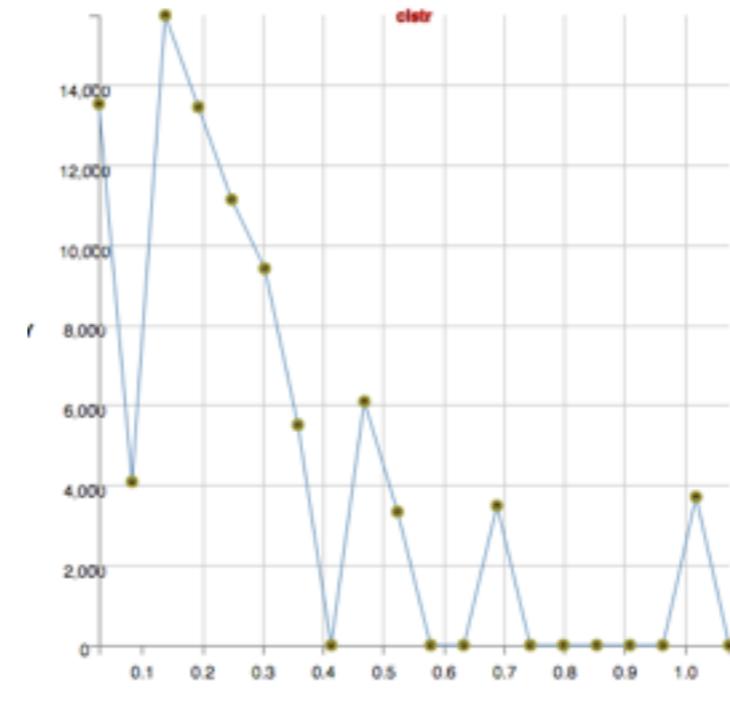
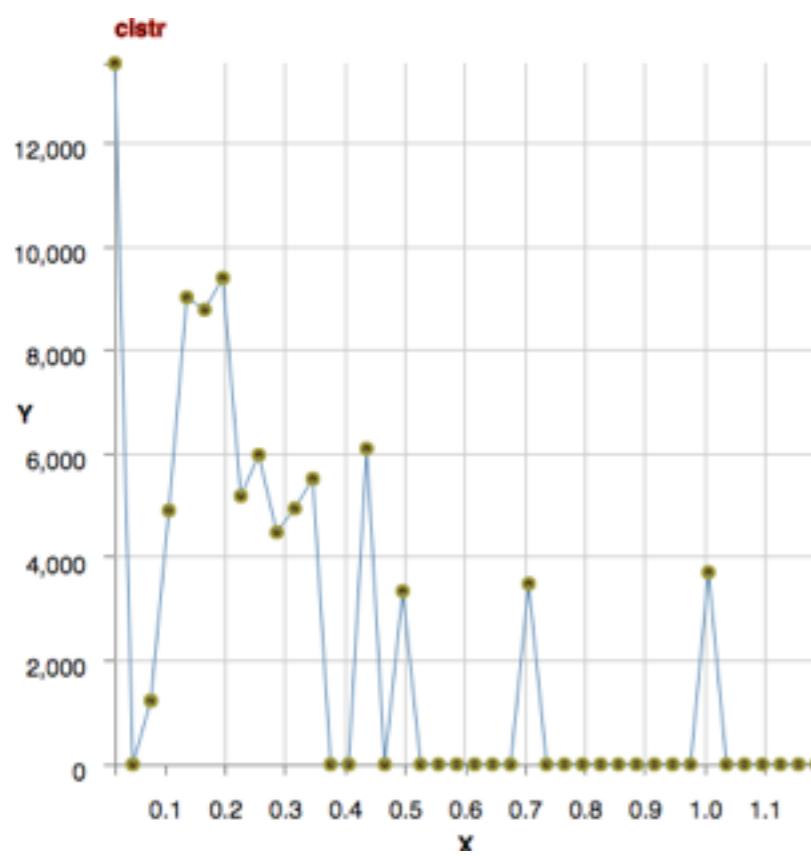
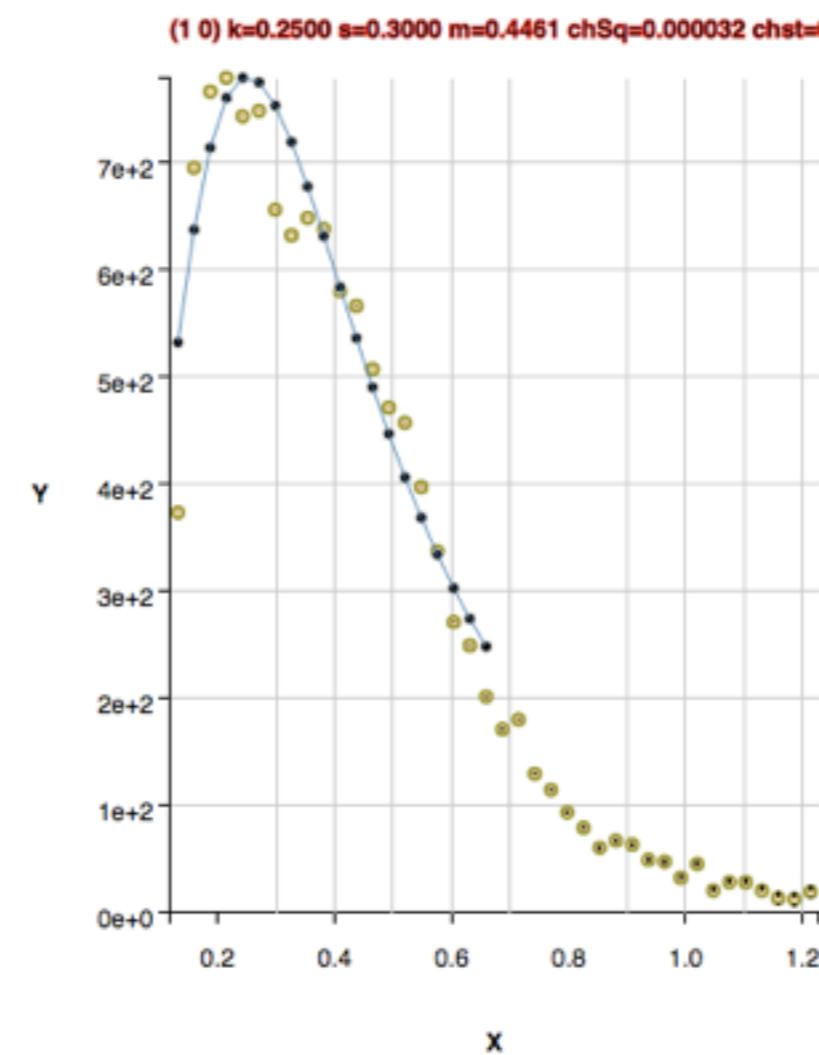
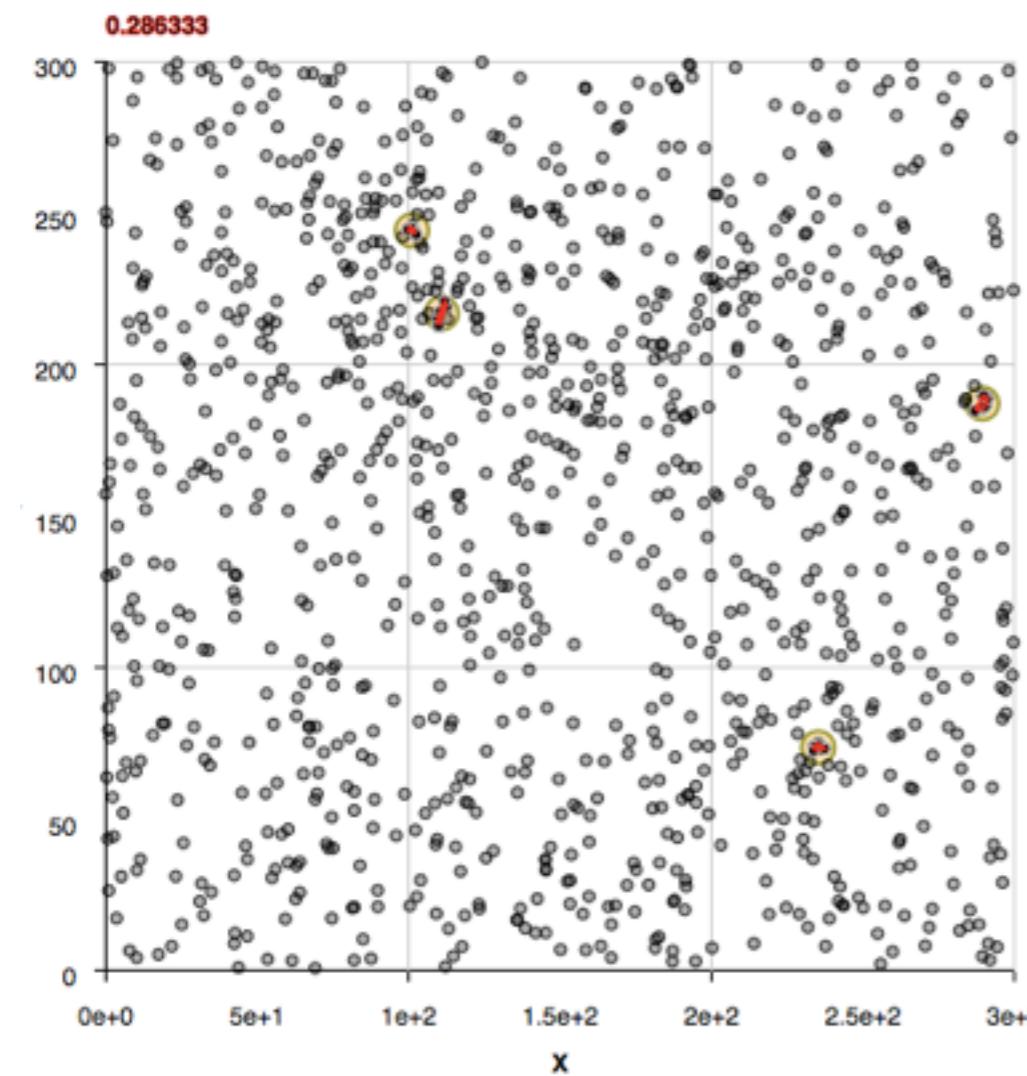
distance transform, then  $1/\sqrt{\text{dist trans}}$  and histogram from 0 to 1.1

**critical density range 0.1 through 0.195**



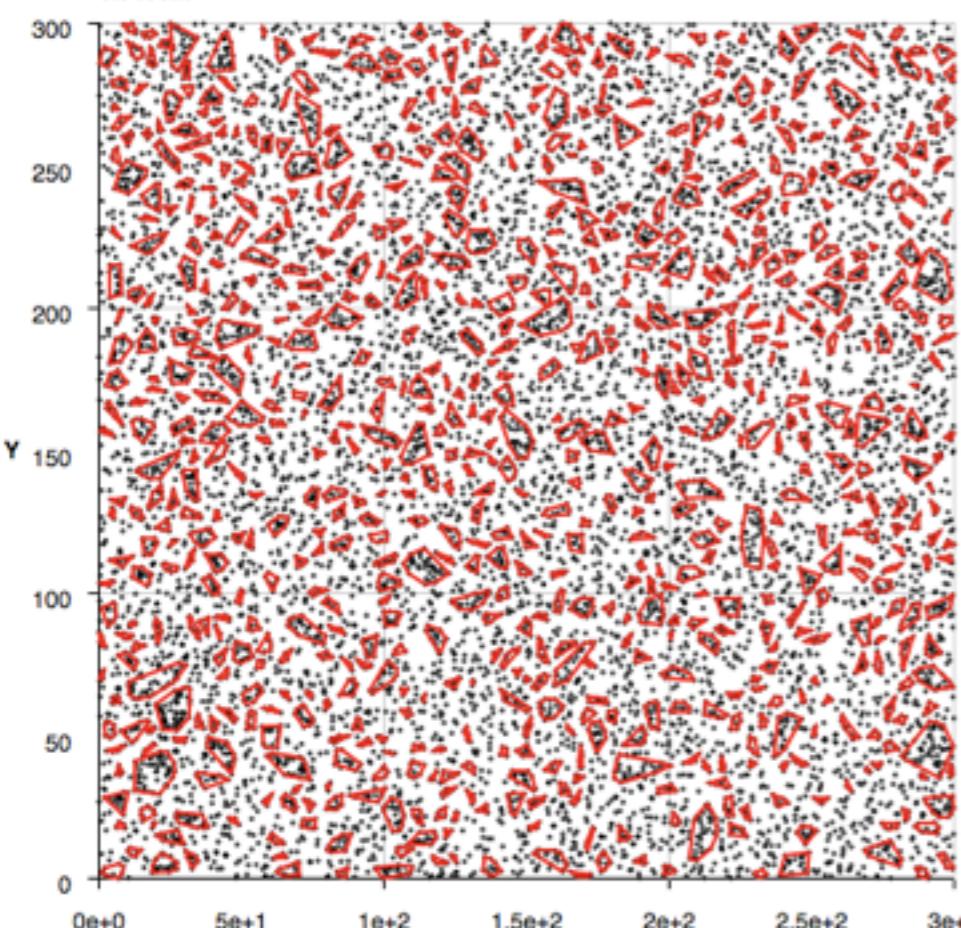
**critical density range**  
**0.01 through 0.05**



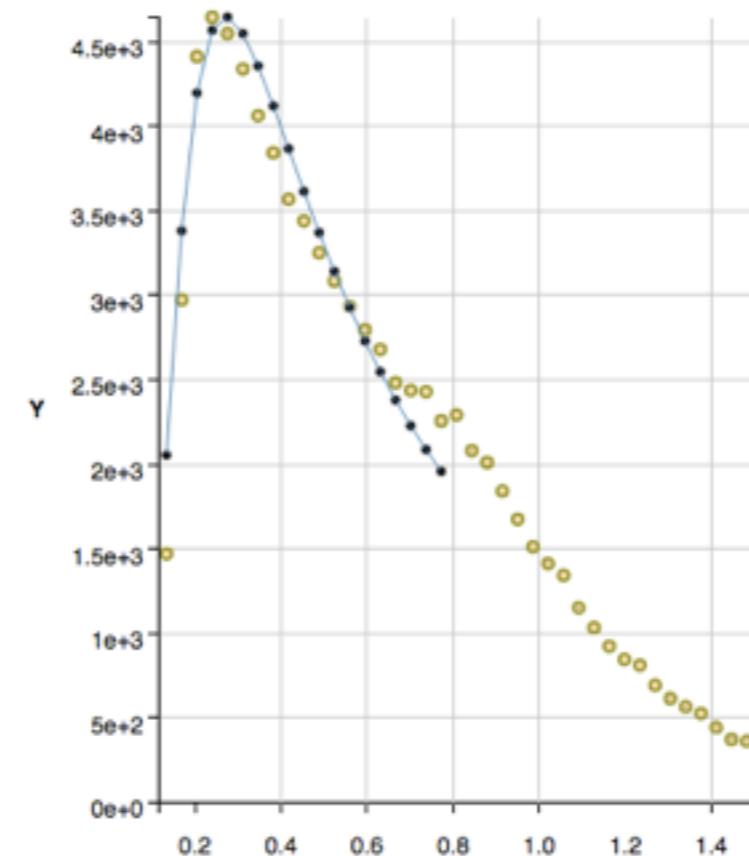


**critical density**  
**range 0.2 through 0.**

0.346529

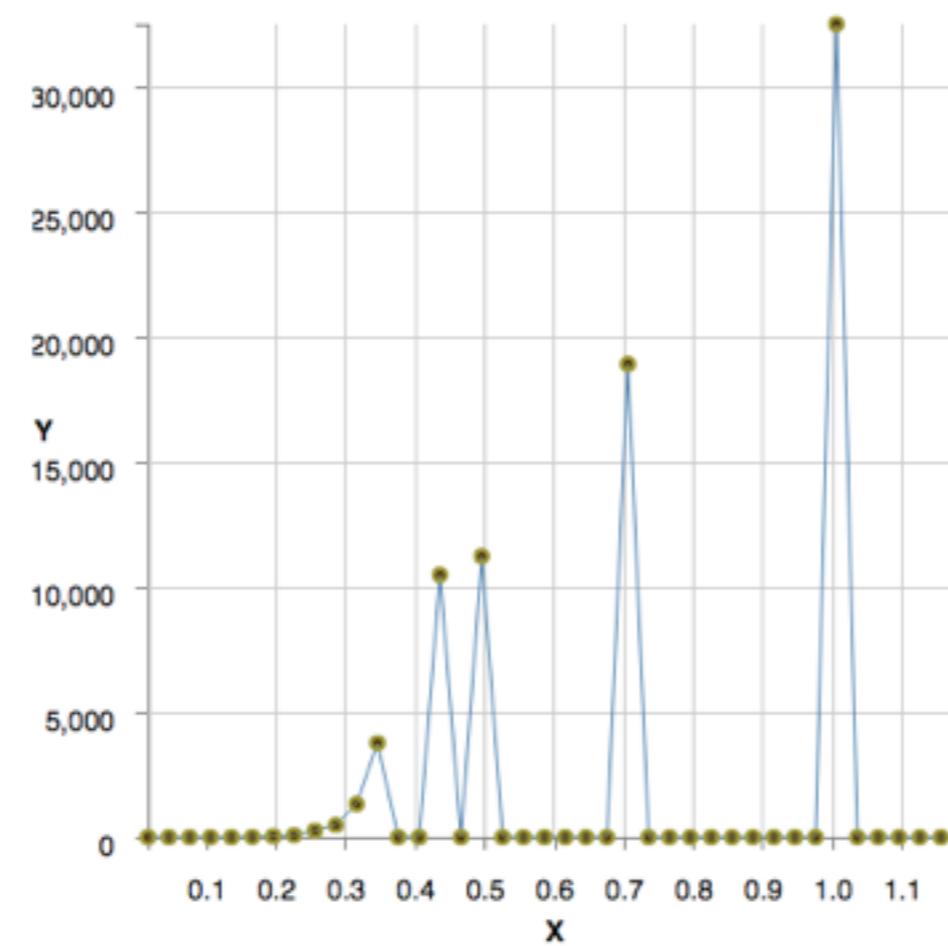


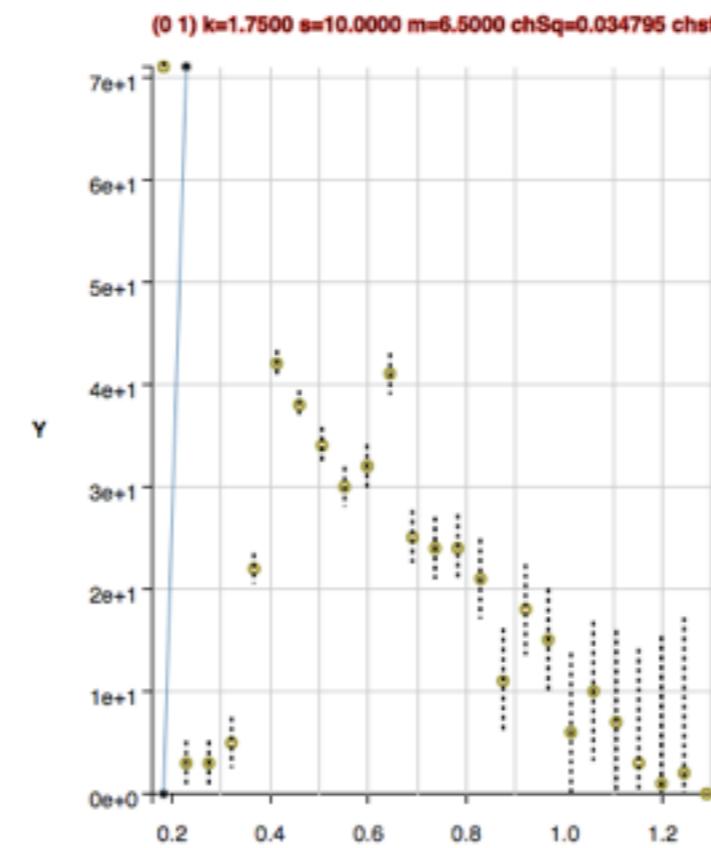
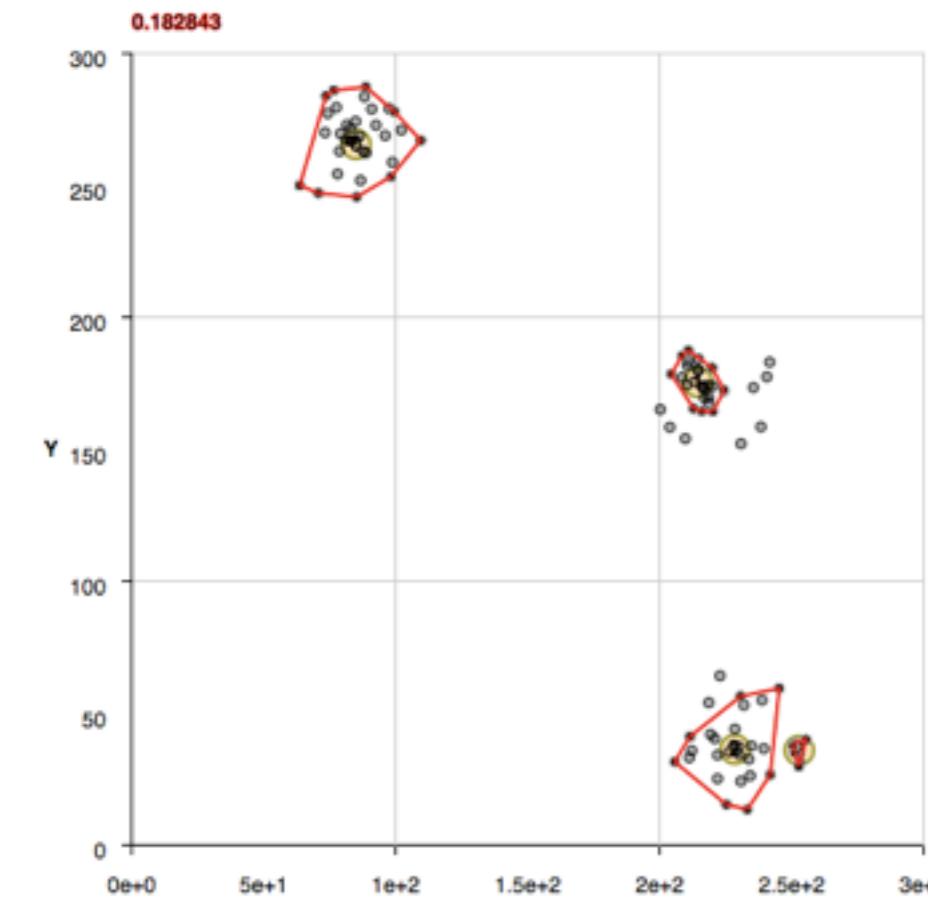
(2 0) k=1.0000 s=0.6500 m=0.6750 chSq=0.000002 chst=0



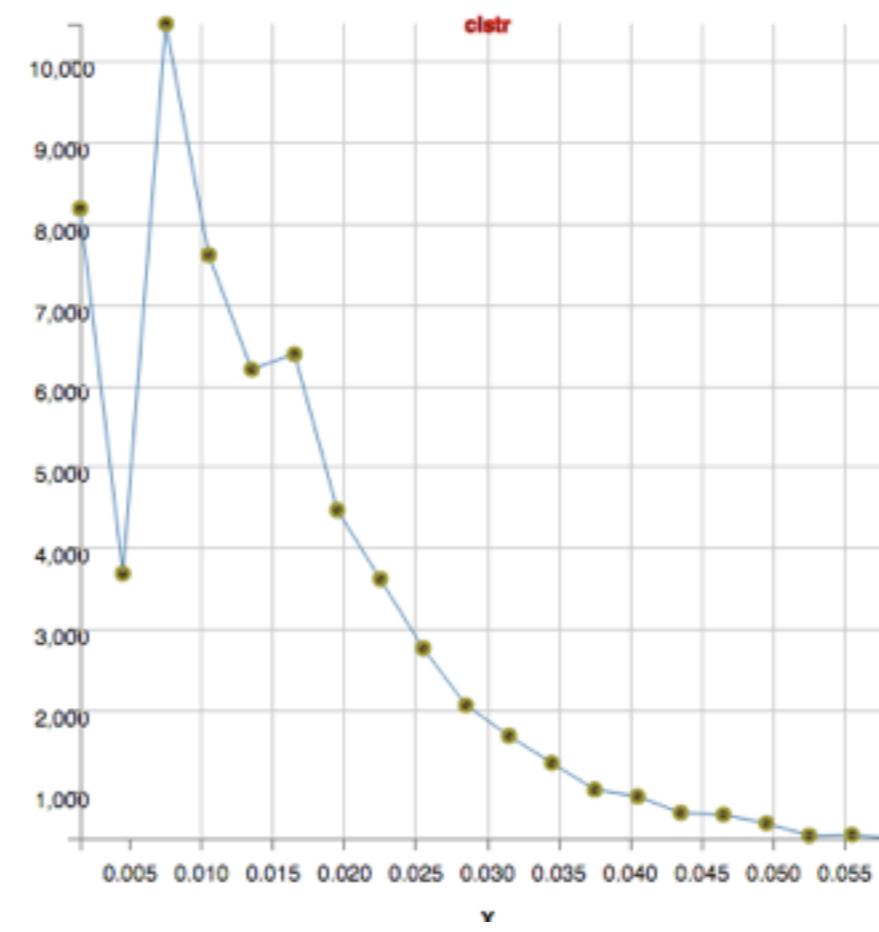
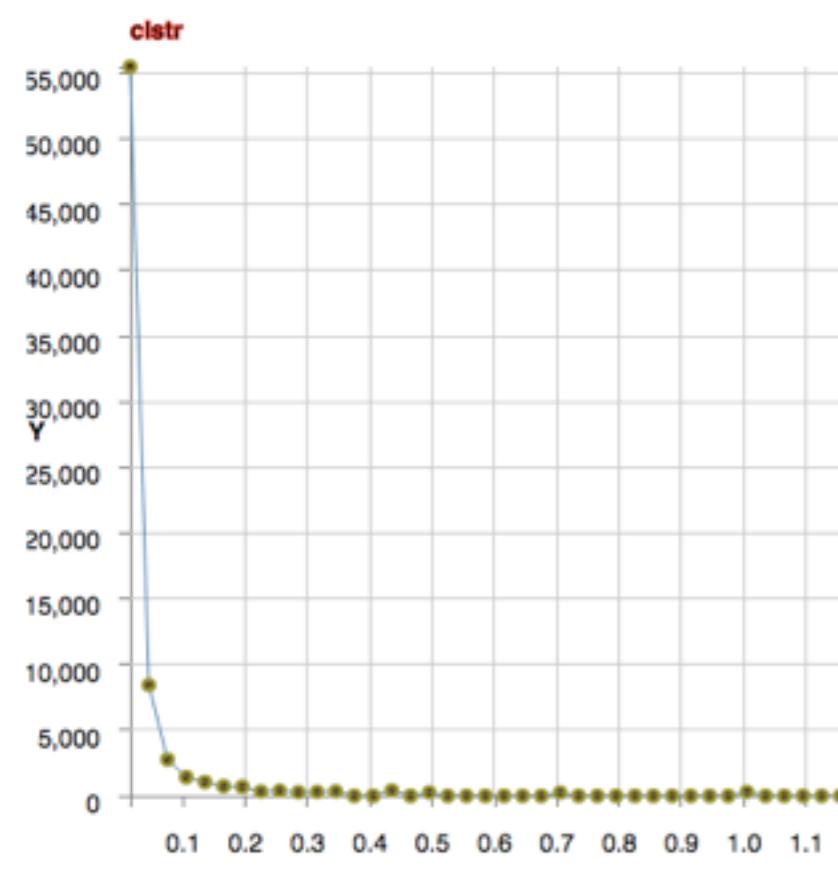
**critical density range**  
**0.4 through 0.5**

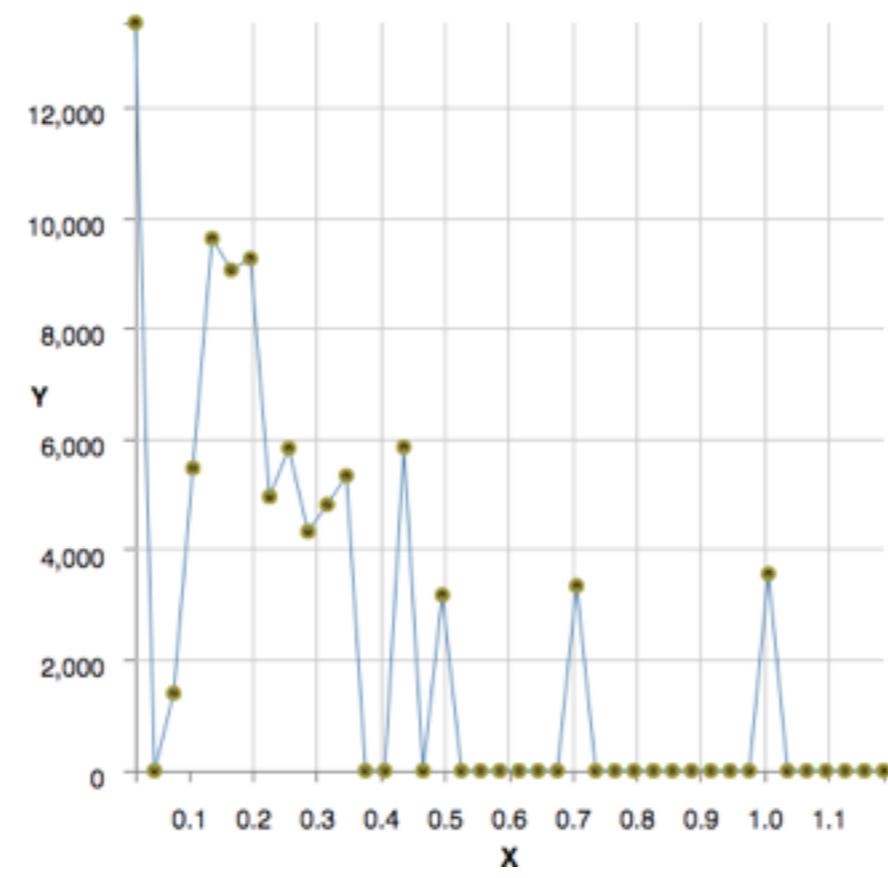
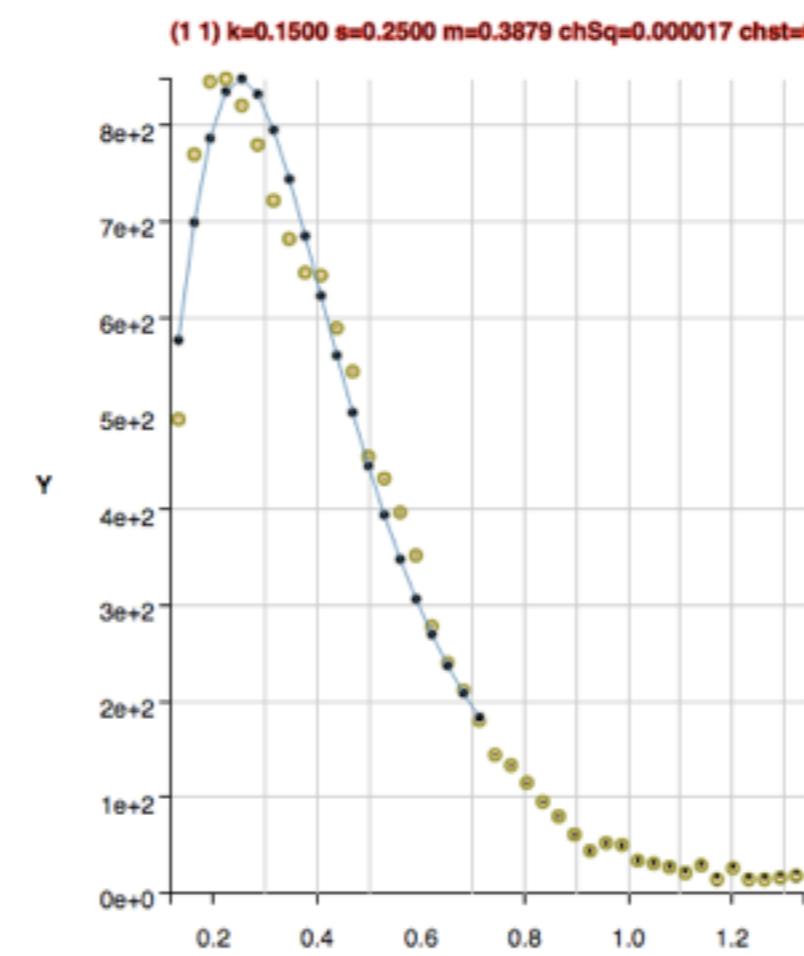
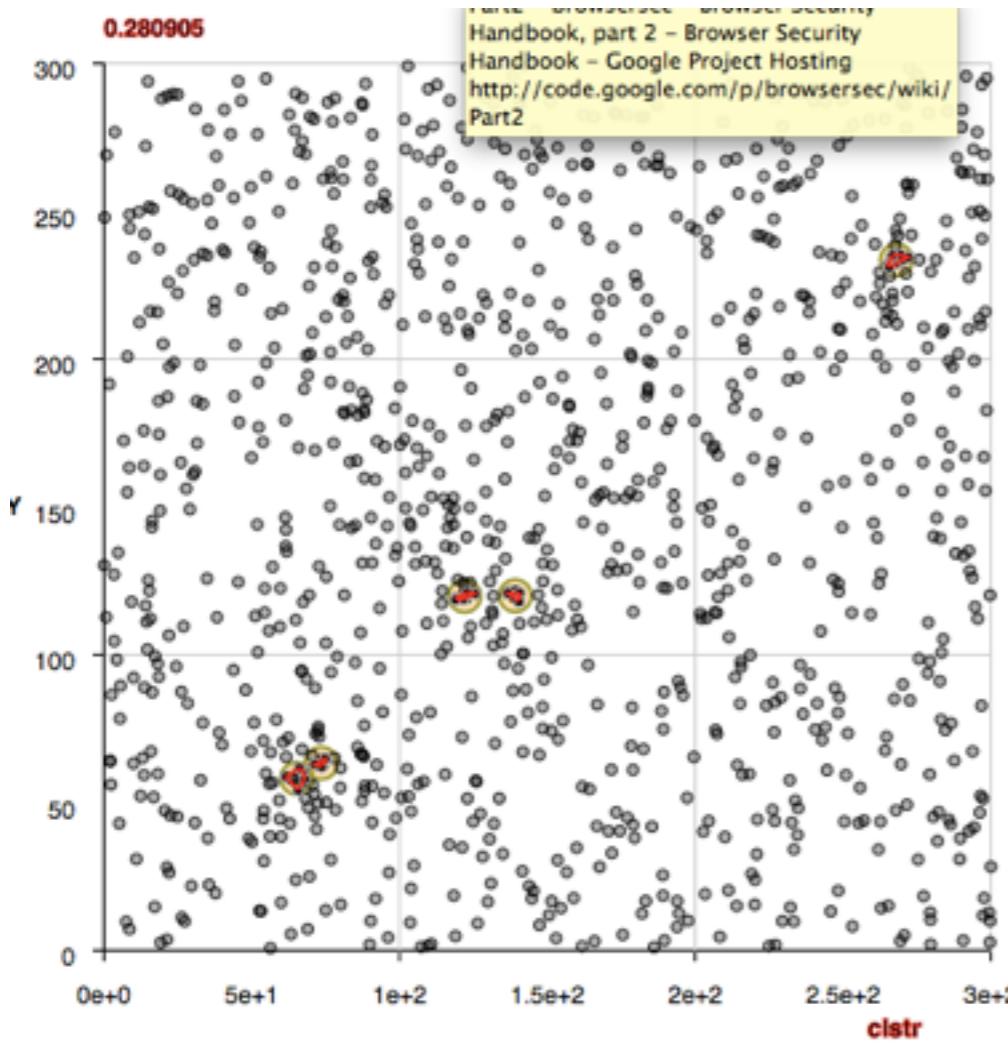
**cistr**

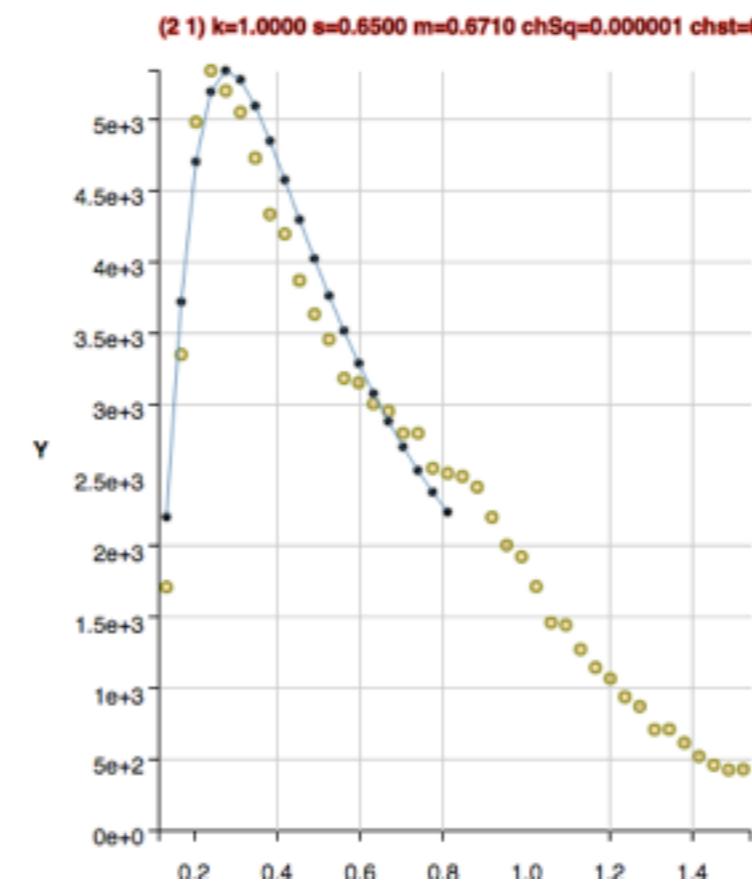
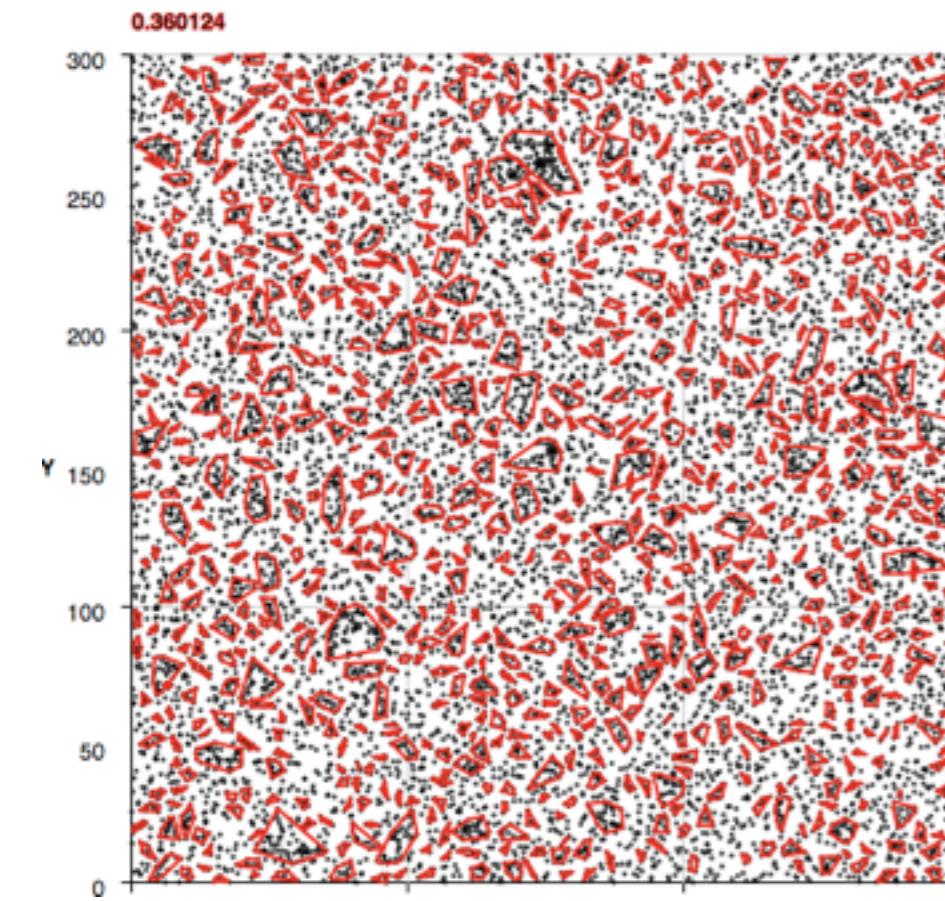




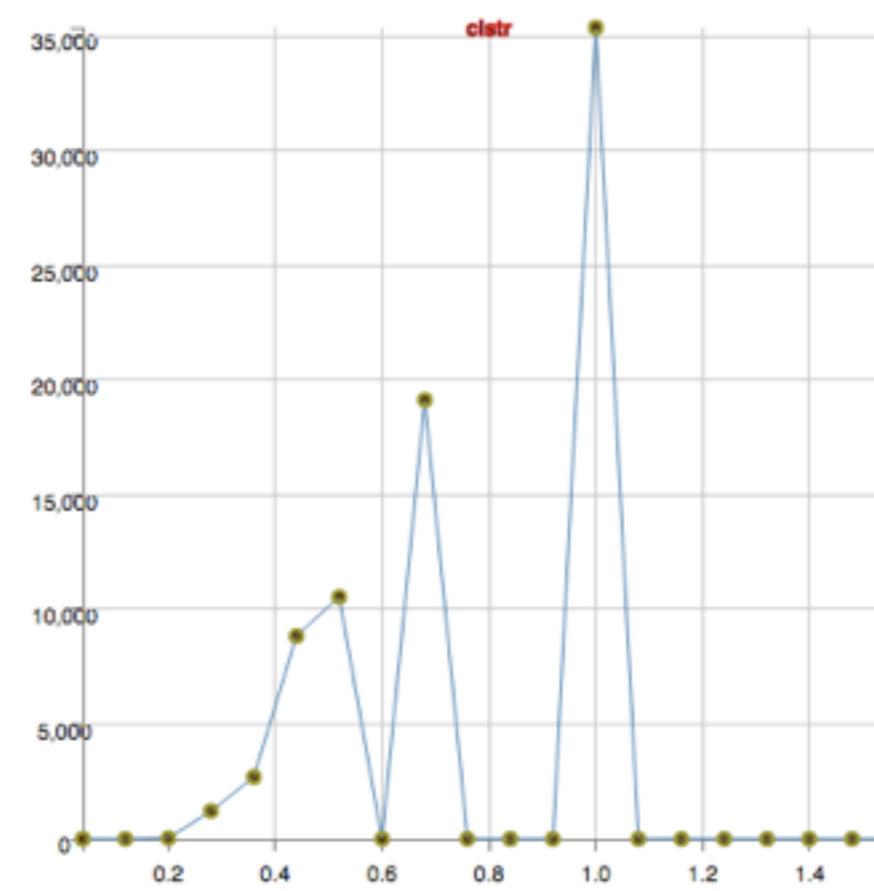
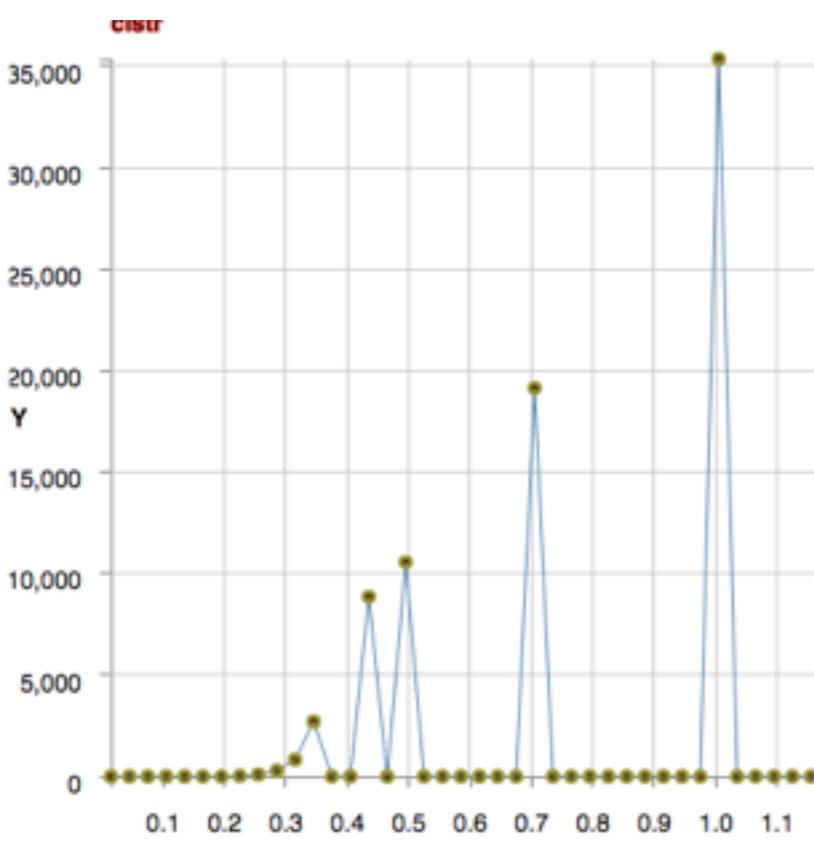
**critical density range**  
**0.01 through 0.05**



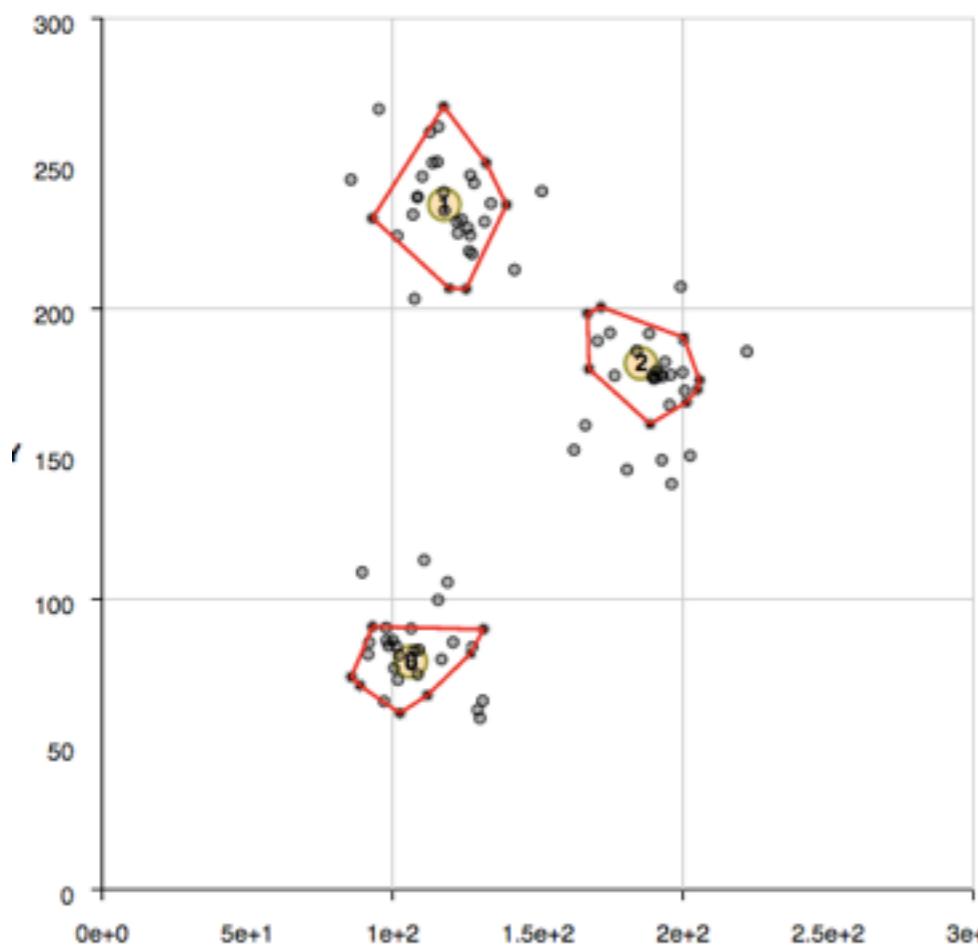




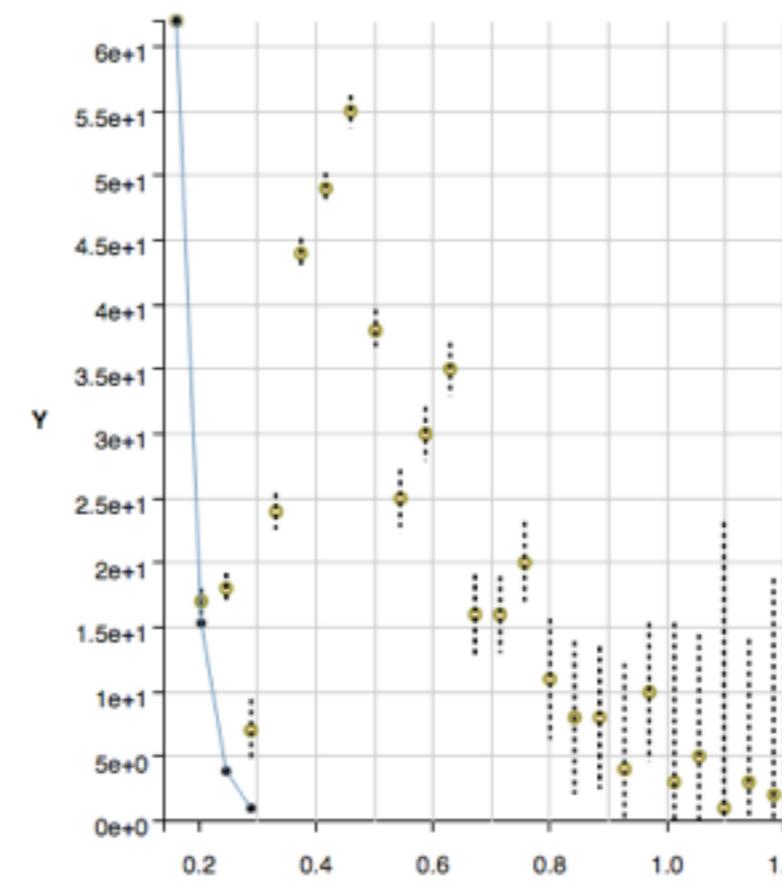
**critical density range**  
**0.35 through 0.45**



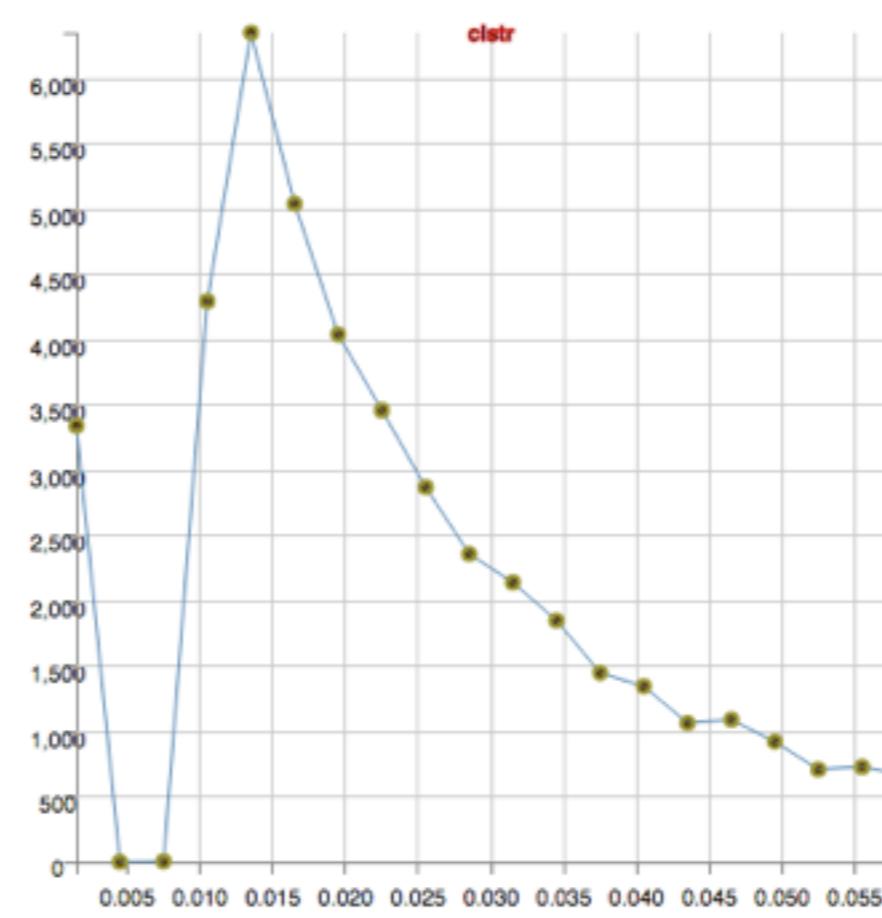
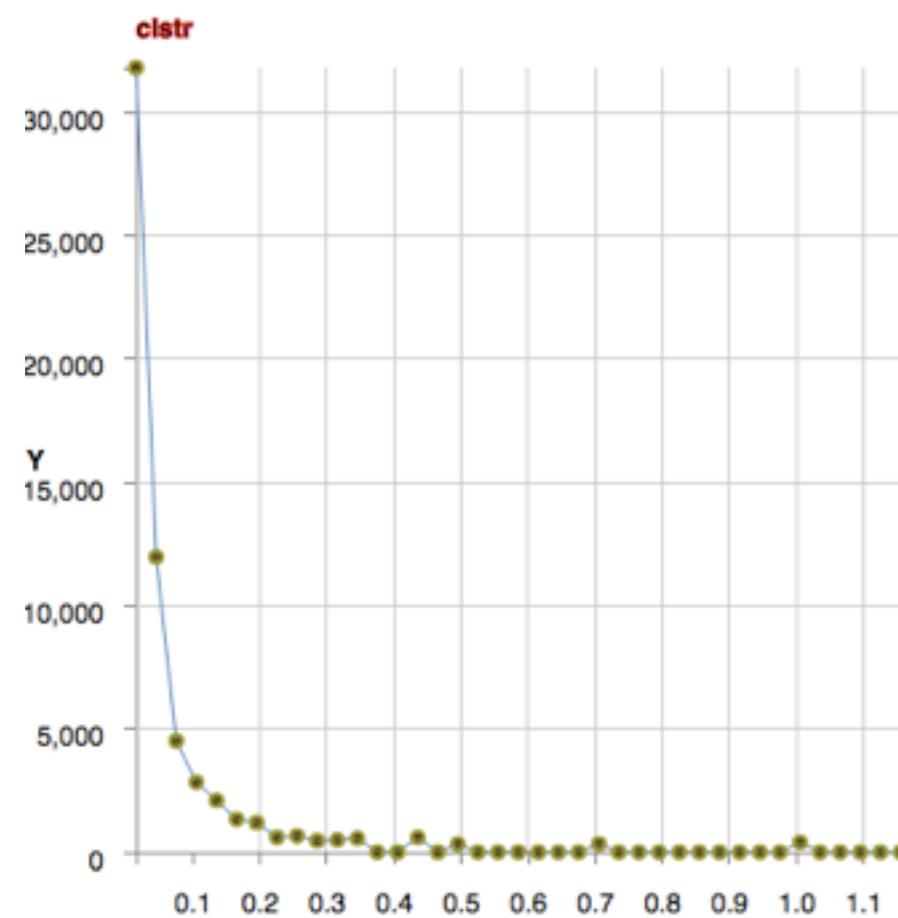
0.161297



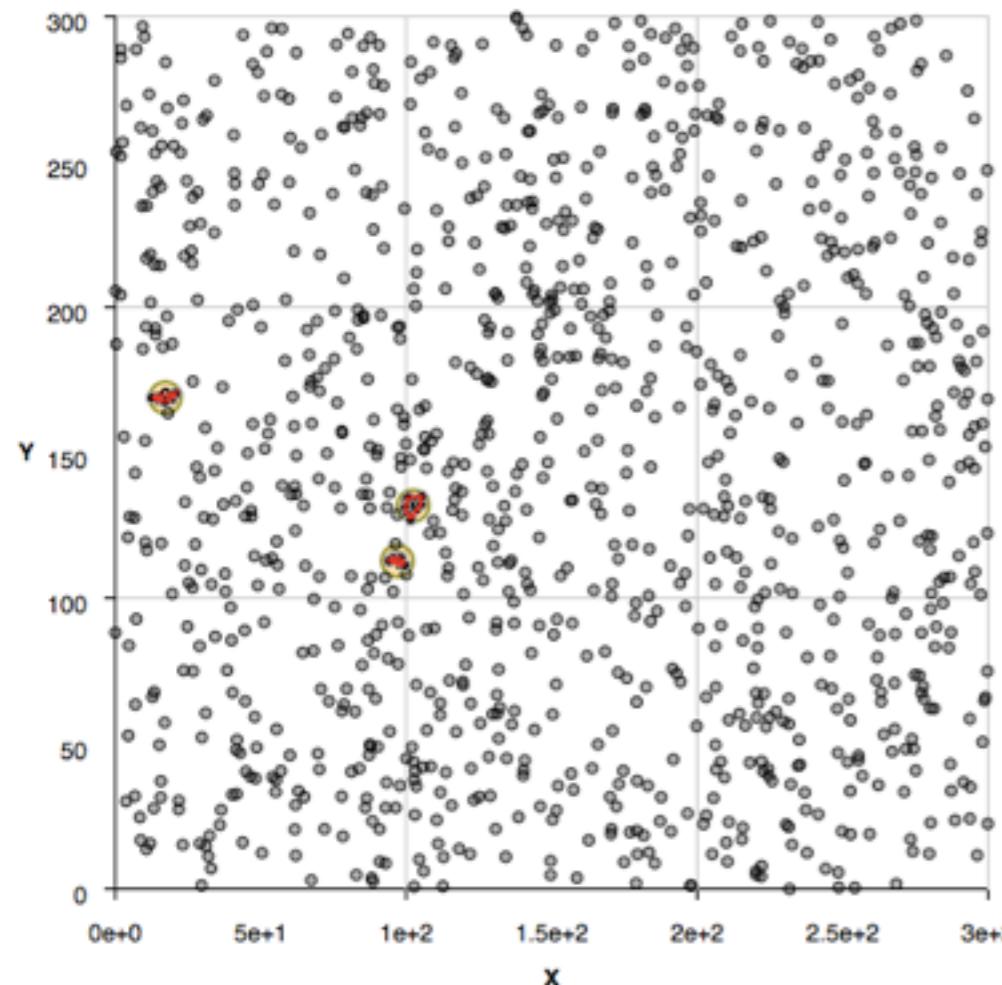
(0 2) k=0.0100 s=0.1000 m=0.0225 chSq=0.001408 chst=Infinity



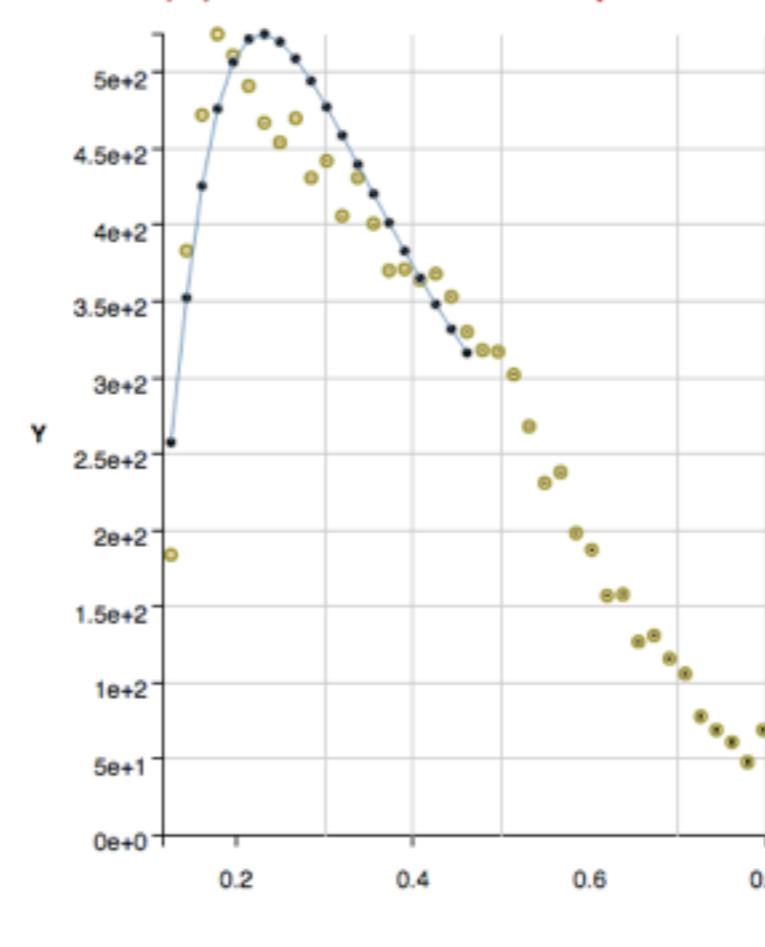
**critical density range**  
**0.03 through 0.04**



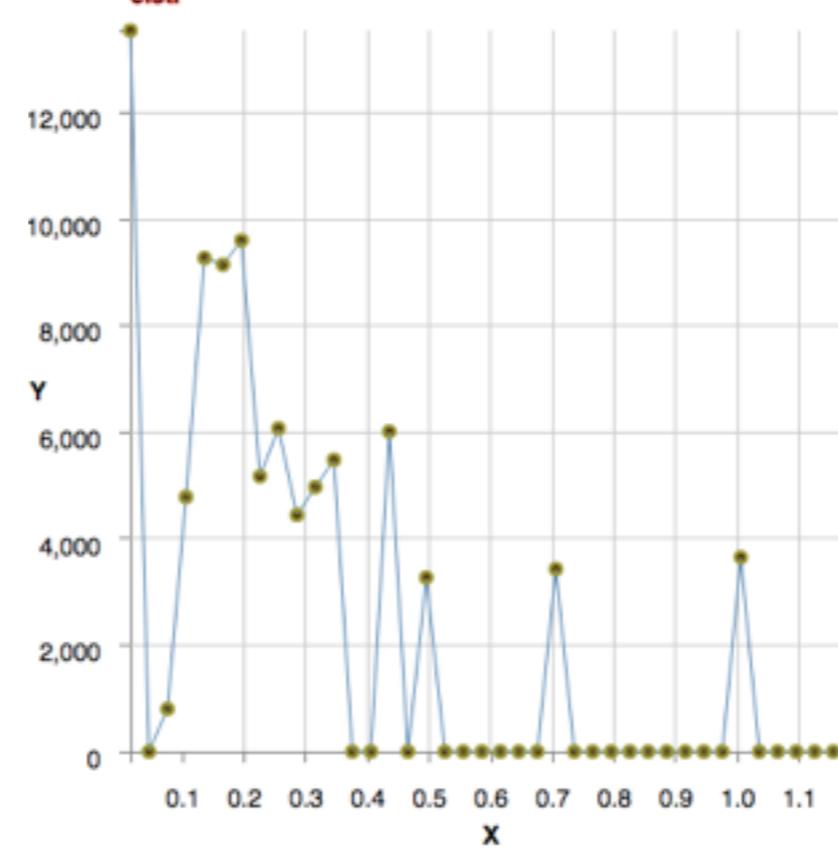
0.282631

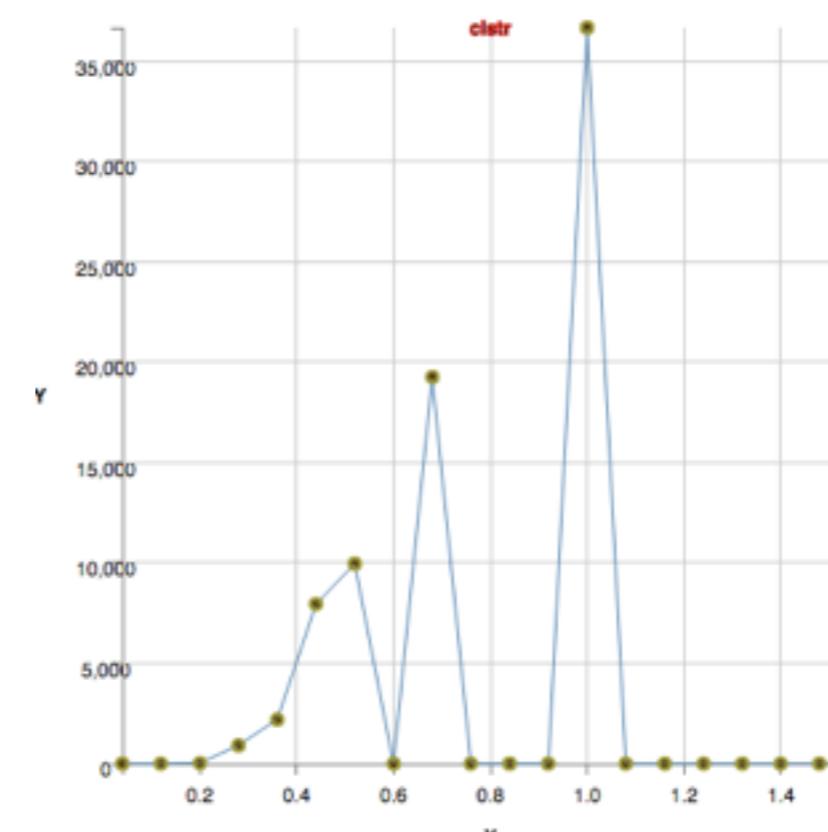
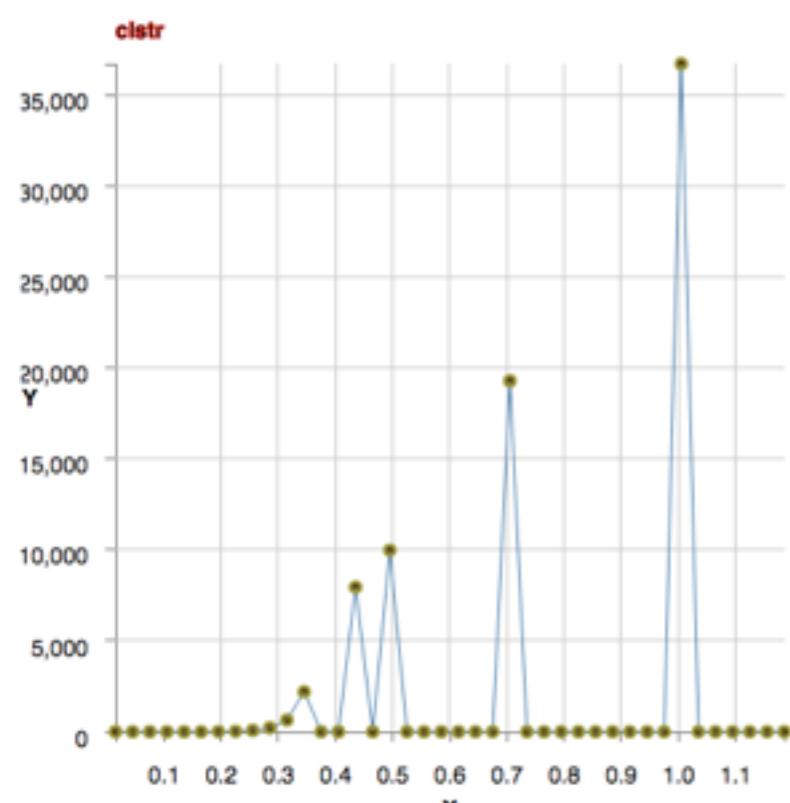
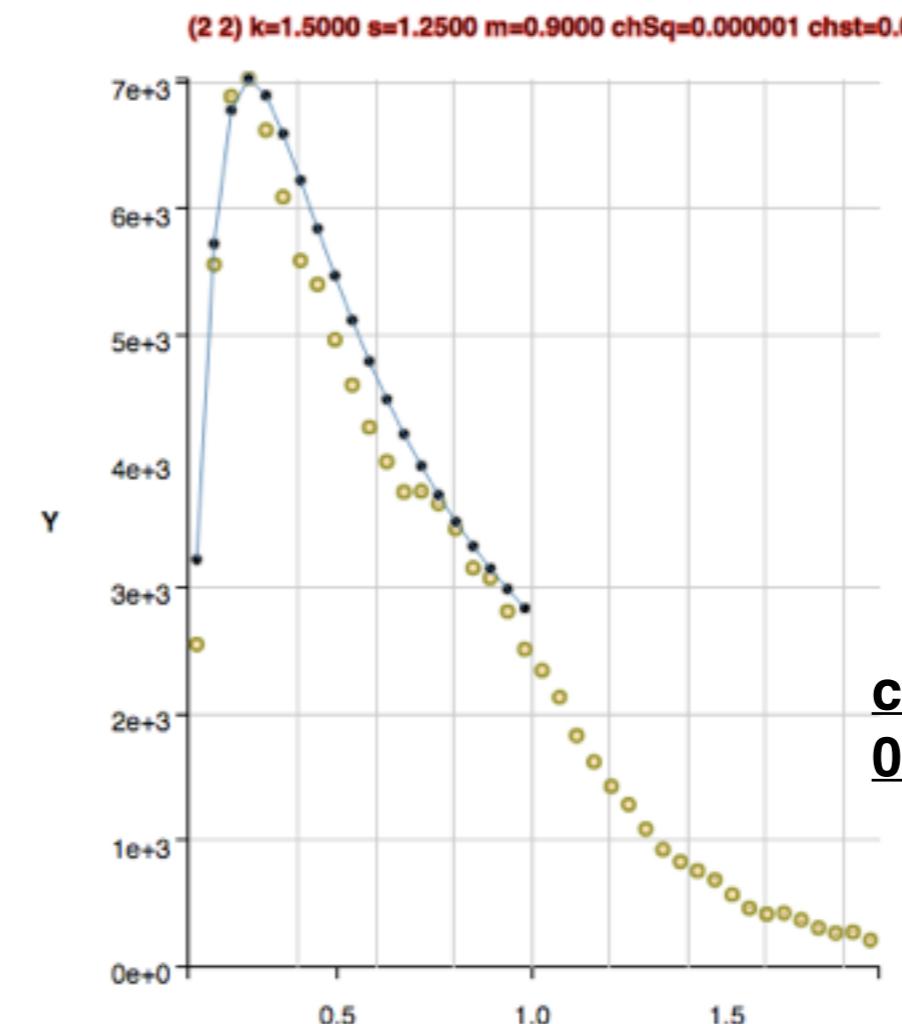
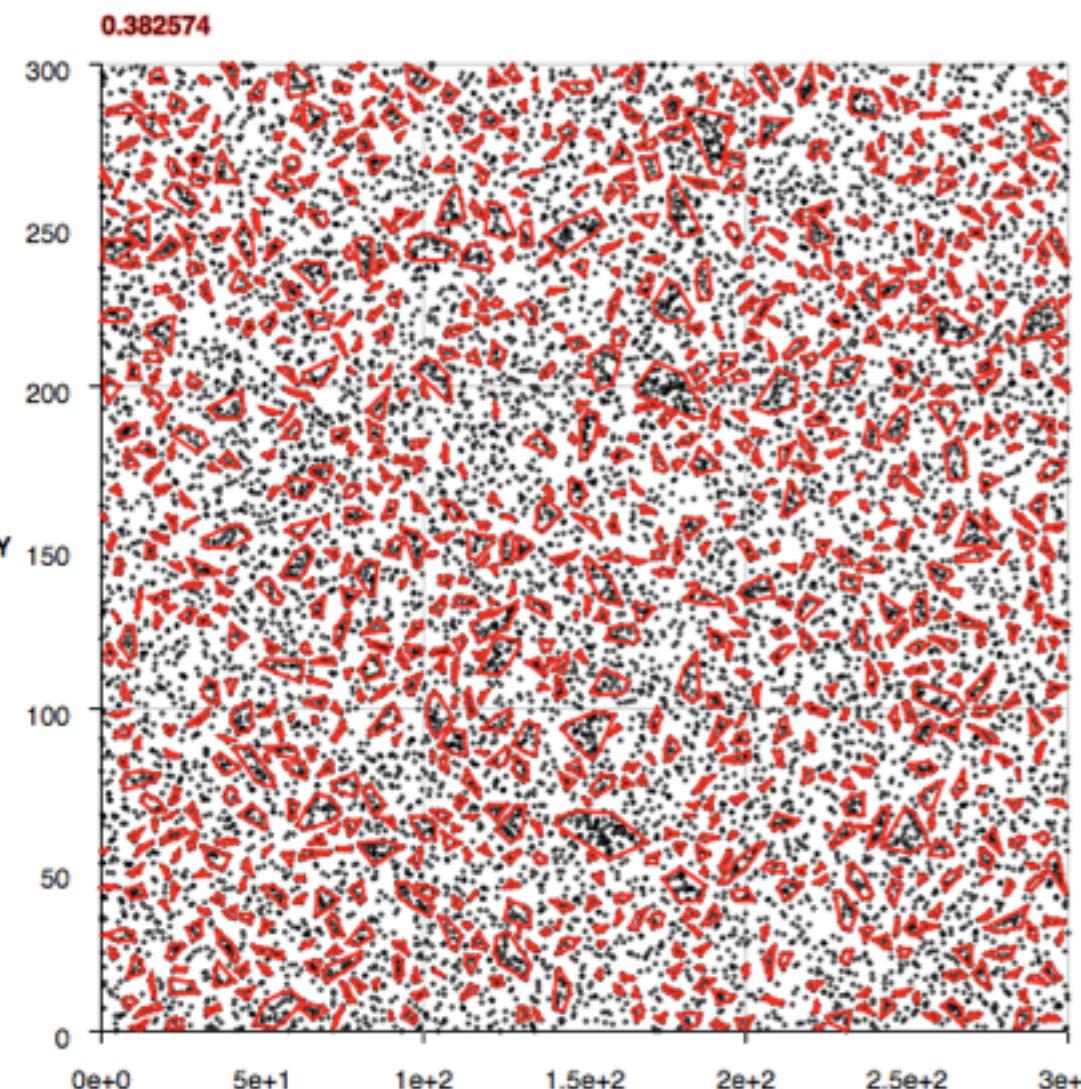


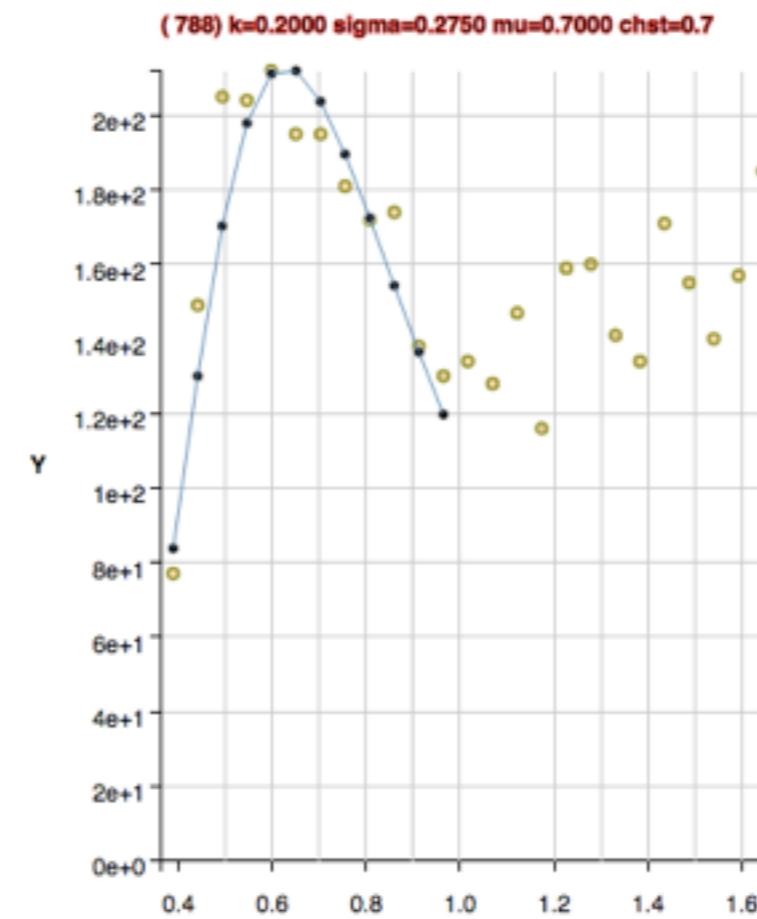
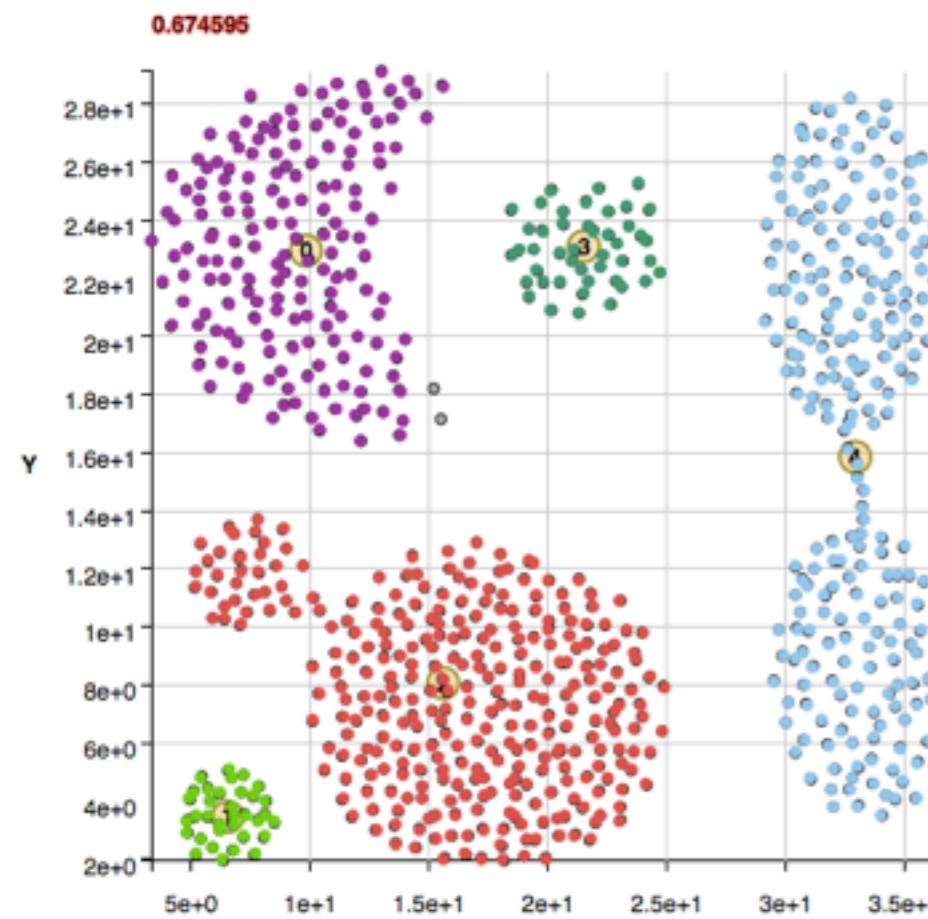
(1 2) k=0.9000 s=0.7250 m=0.8500 chSq=0.000050 chst=0.0



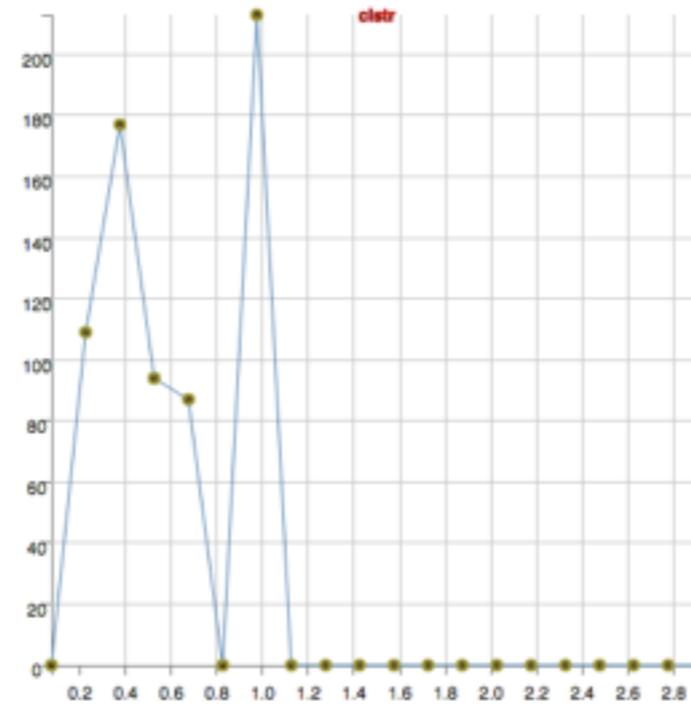
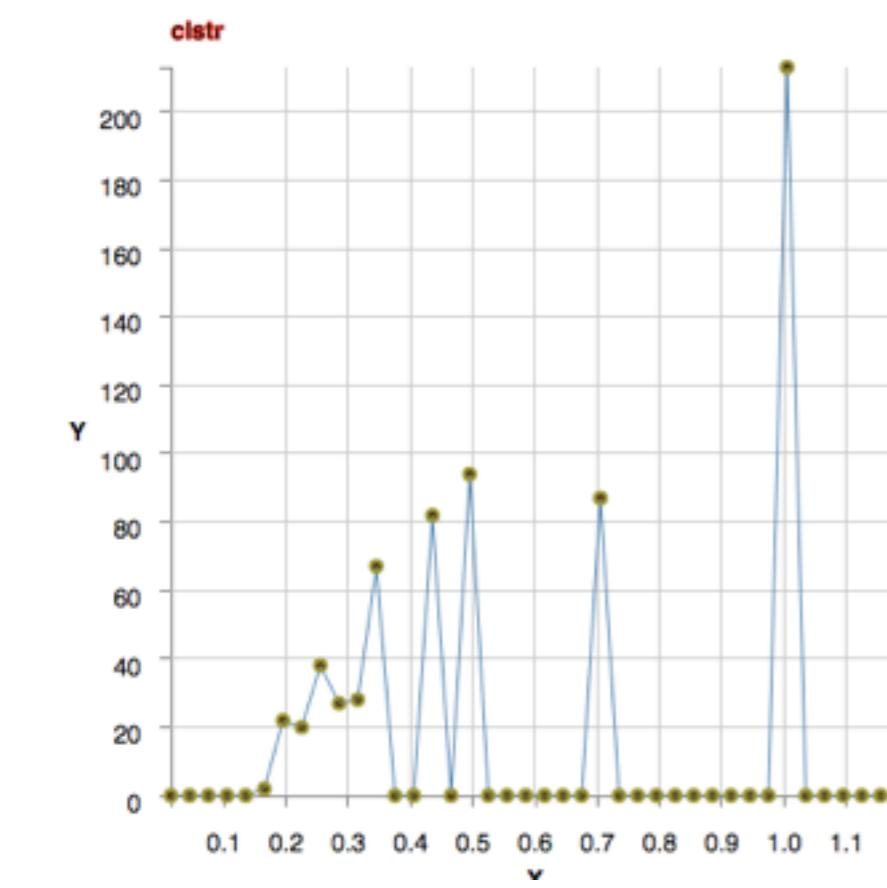
cistr

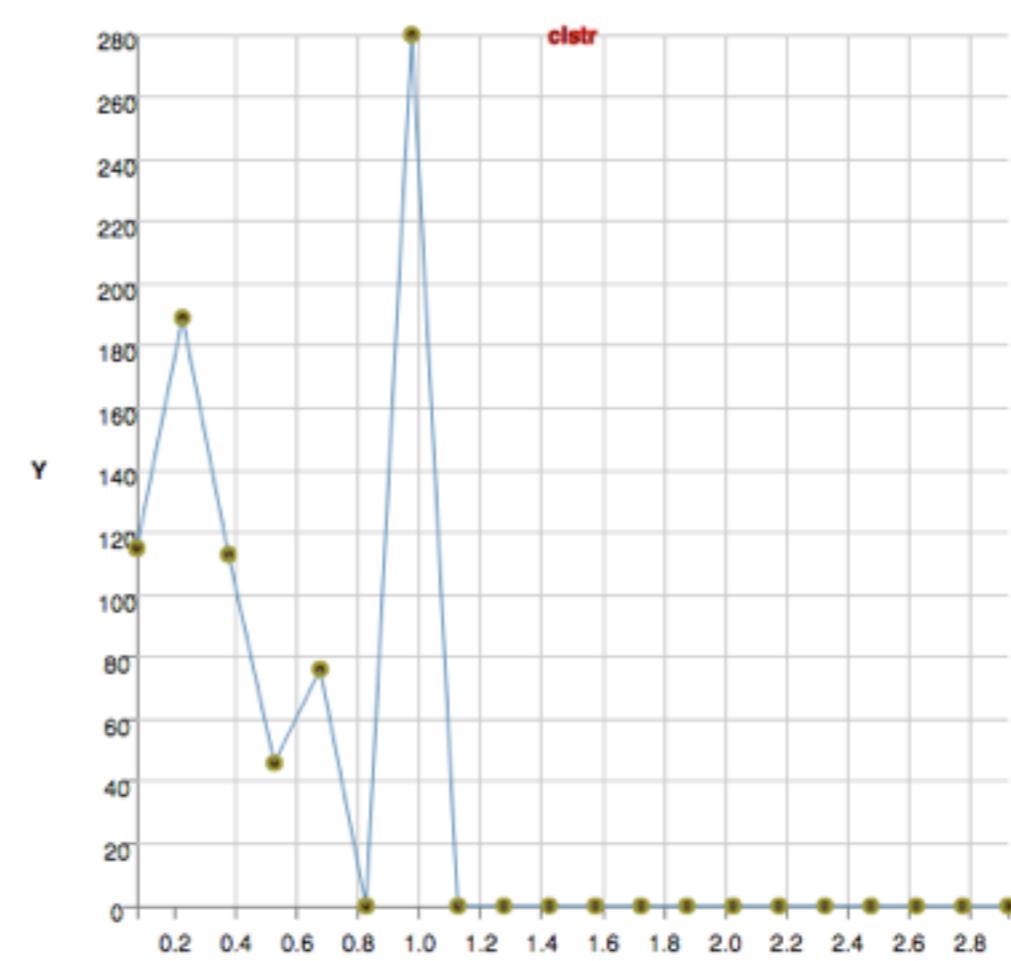
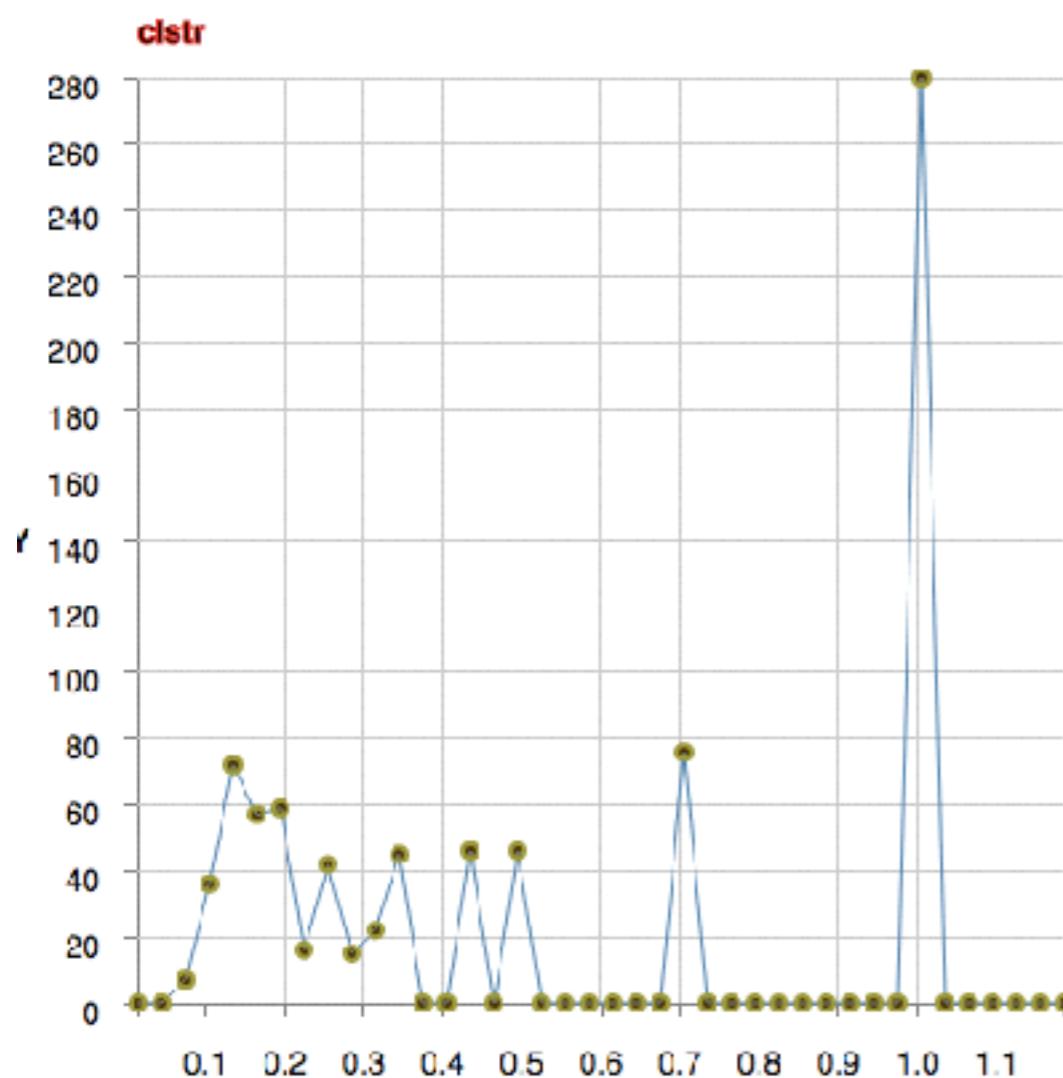
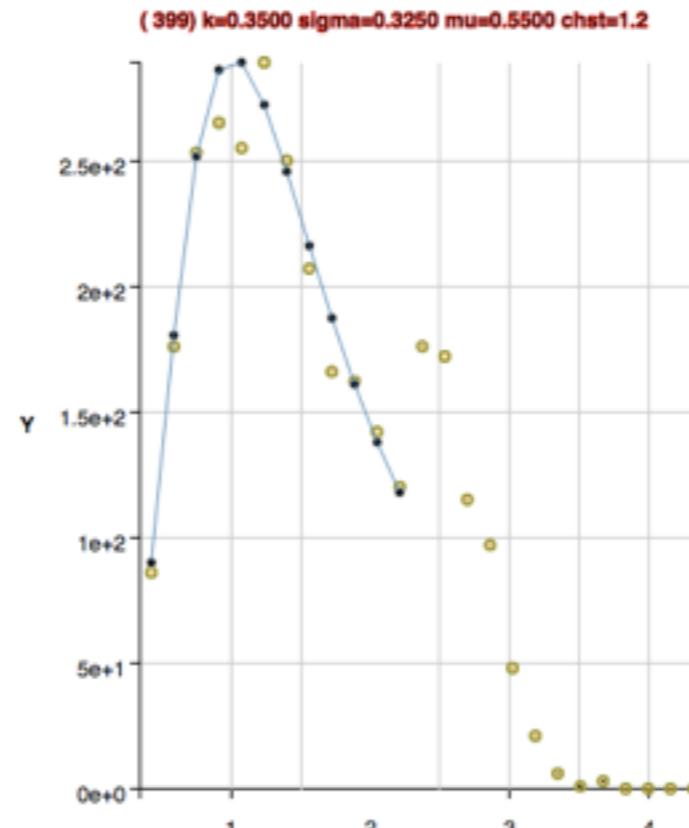
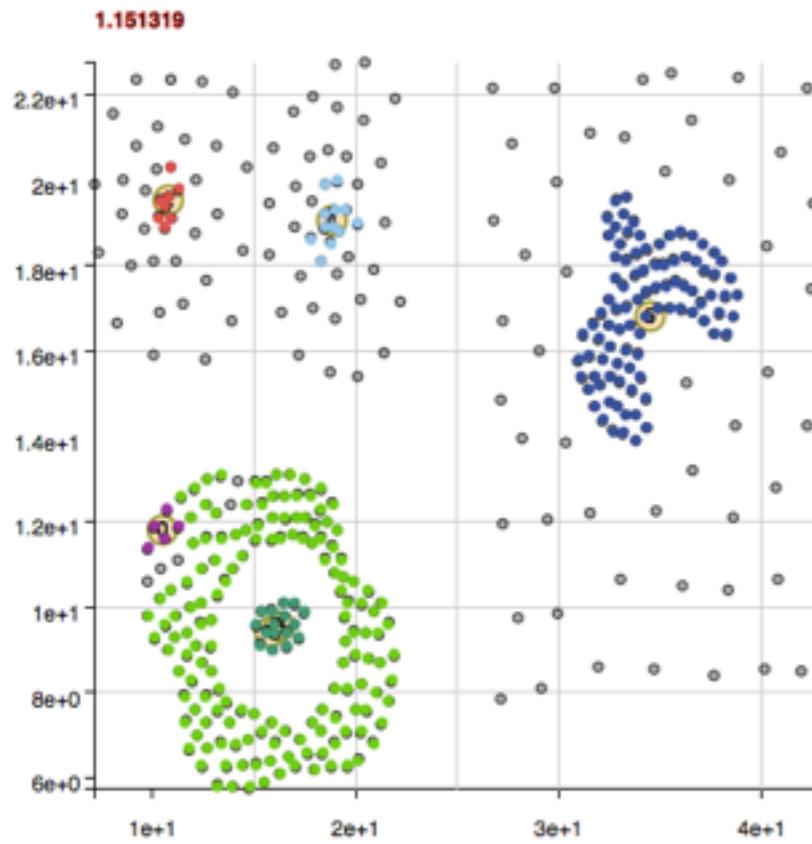






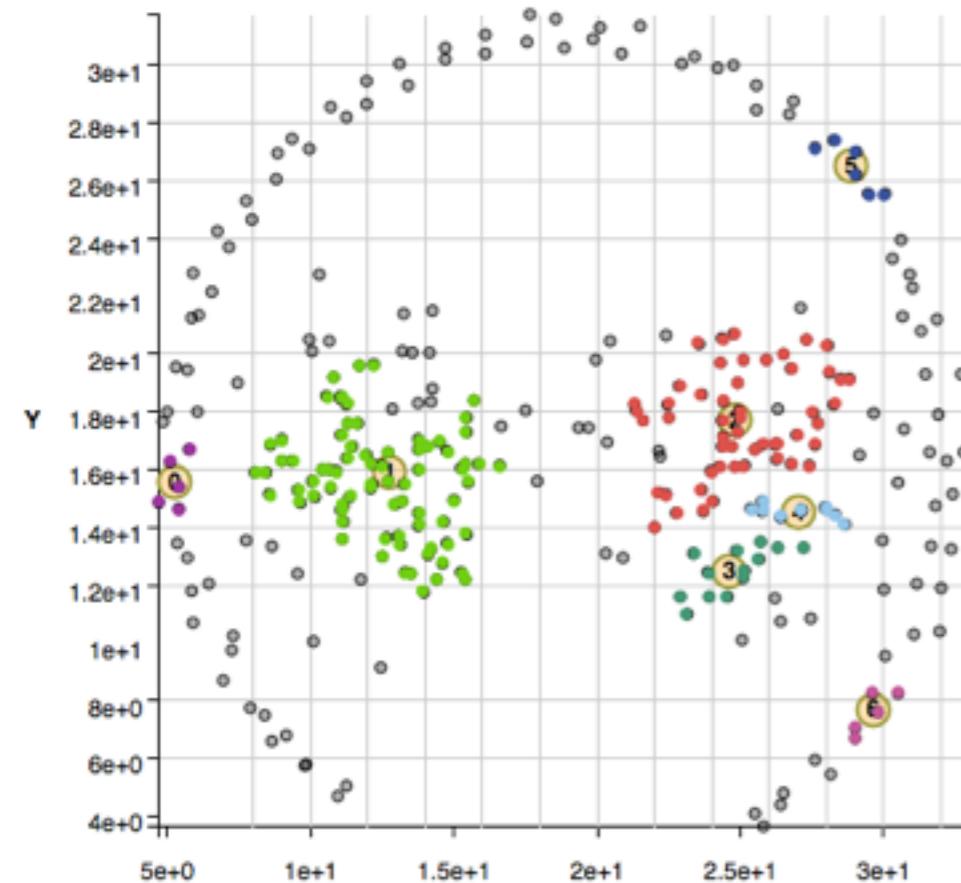
**critical density range**  
**0.35 through 0.75**



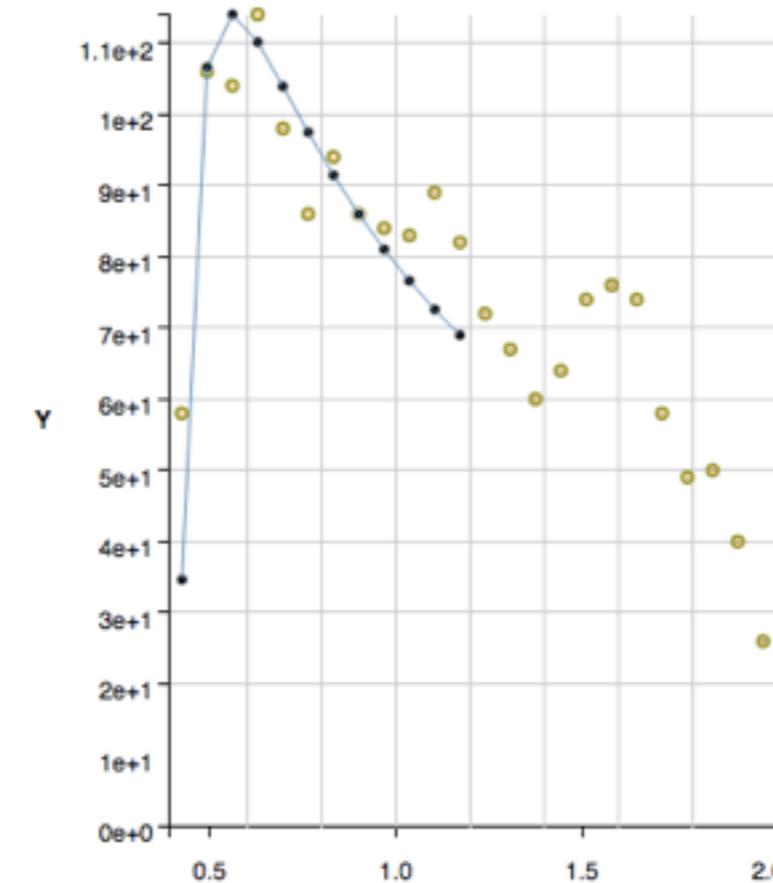


**critical density range**  
**0.55 through 1.1**

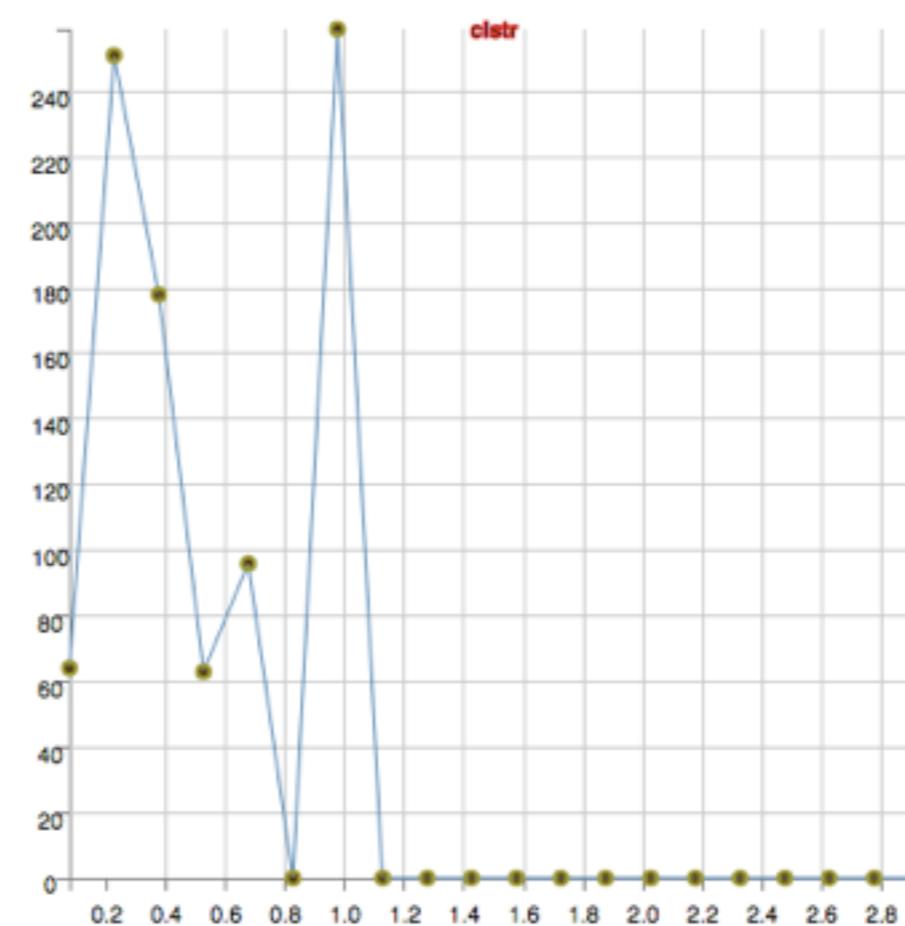
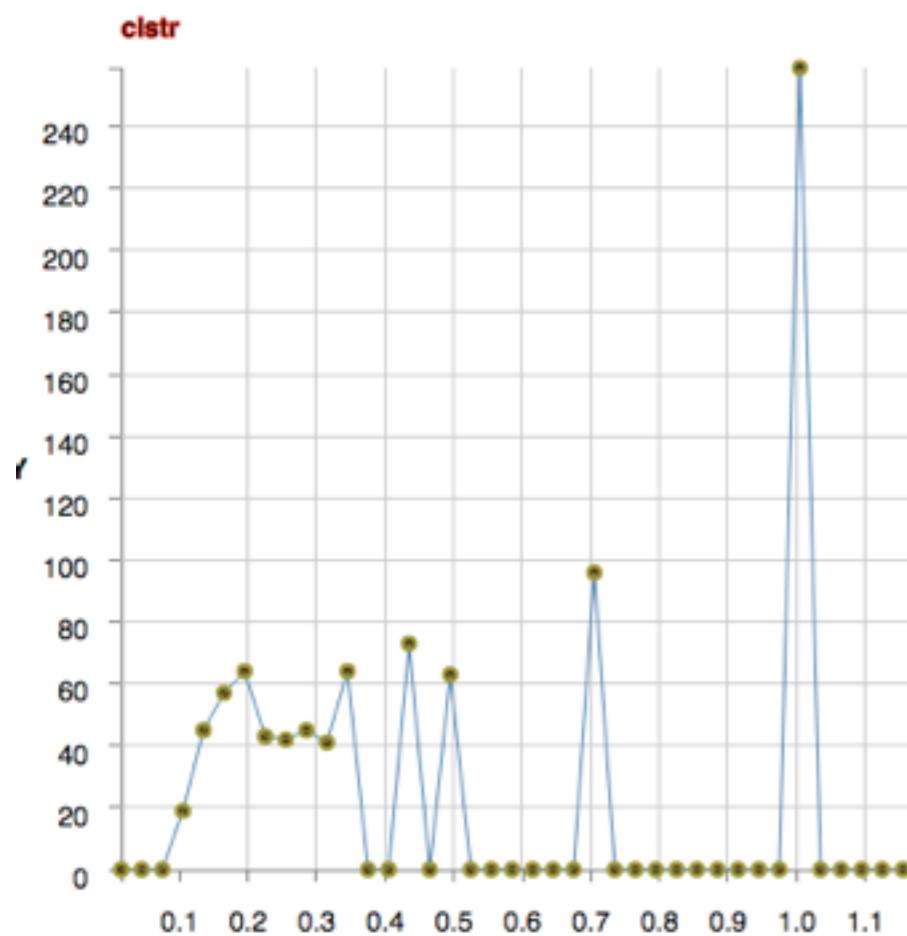
0.766755

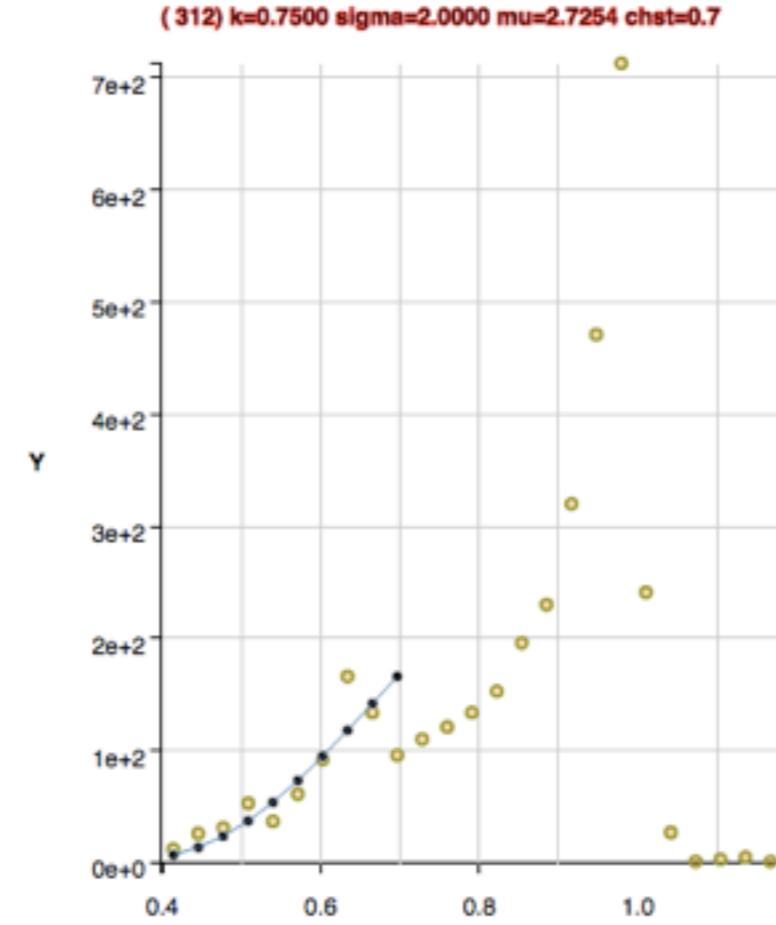
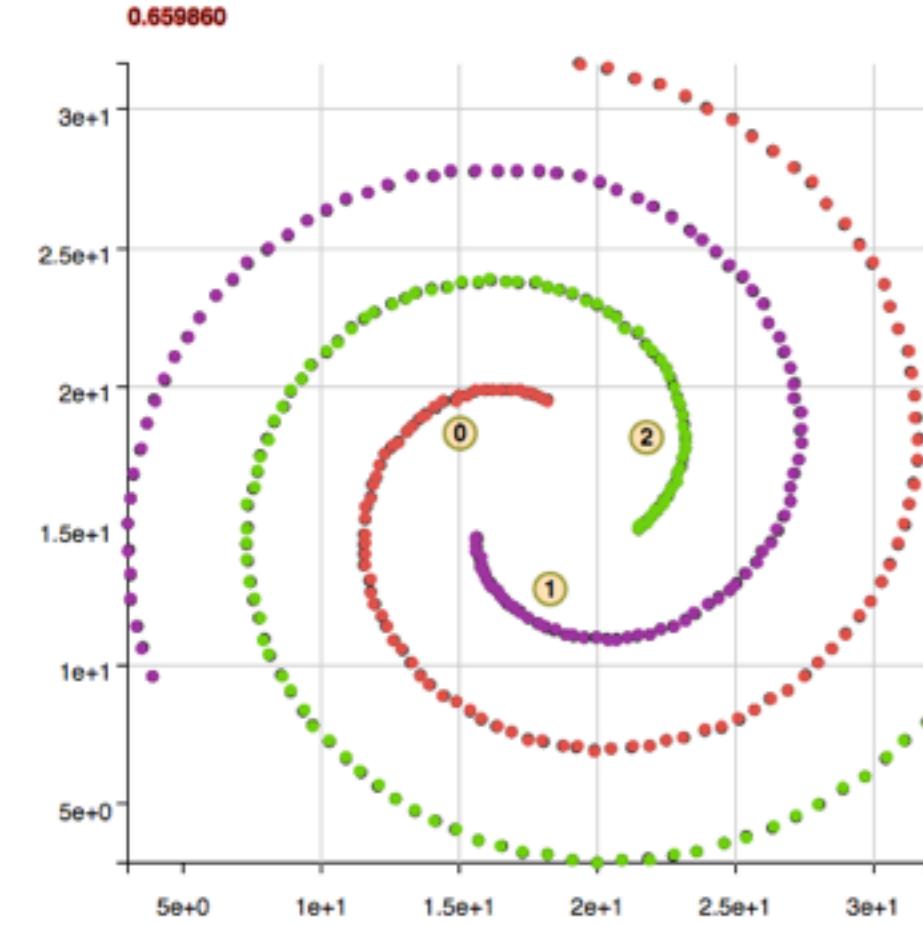


( 300) k=3.0000 sigma=24.3035 mu=8.4481 chst=0.8

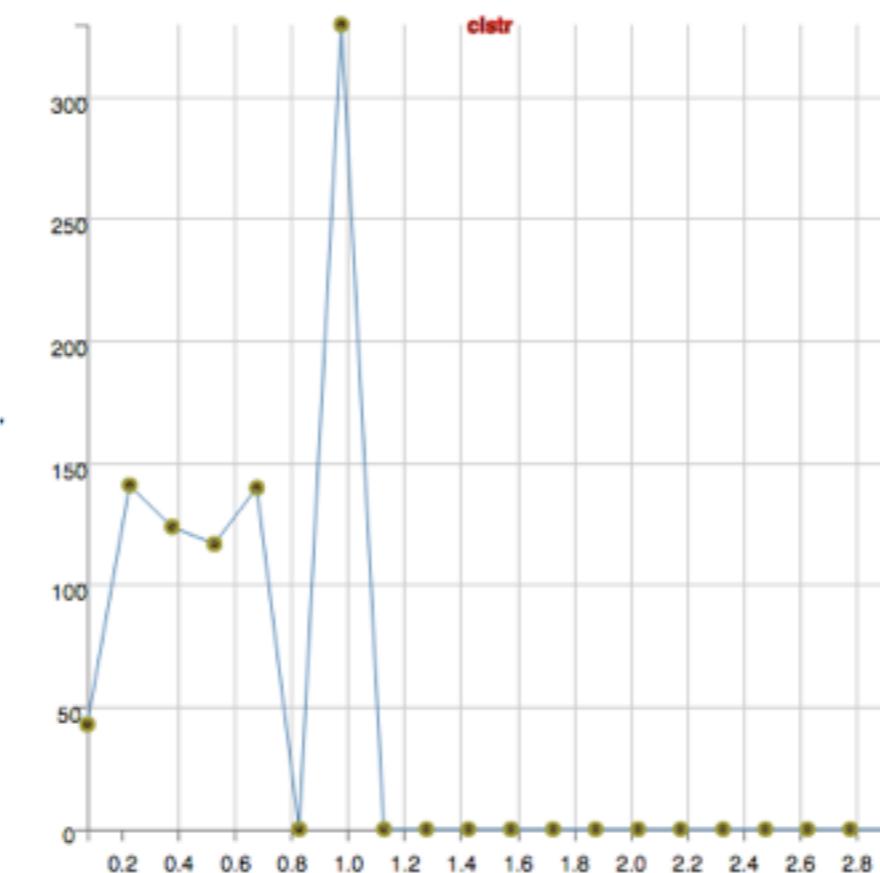
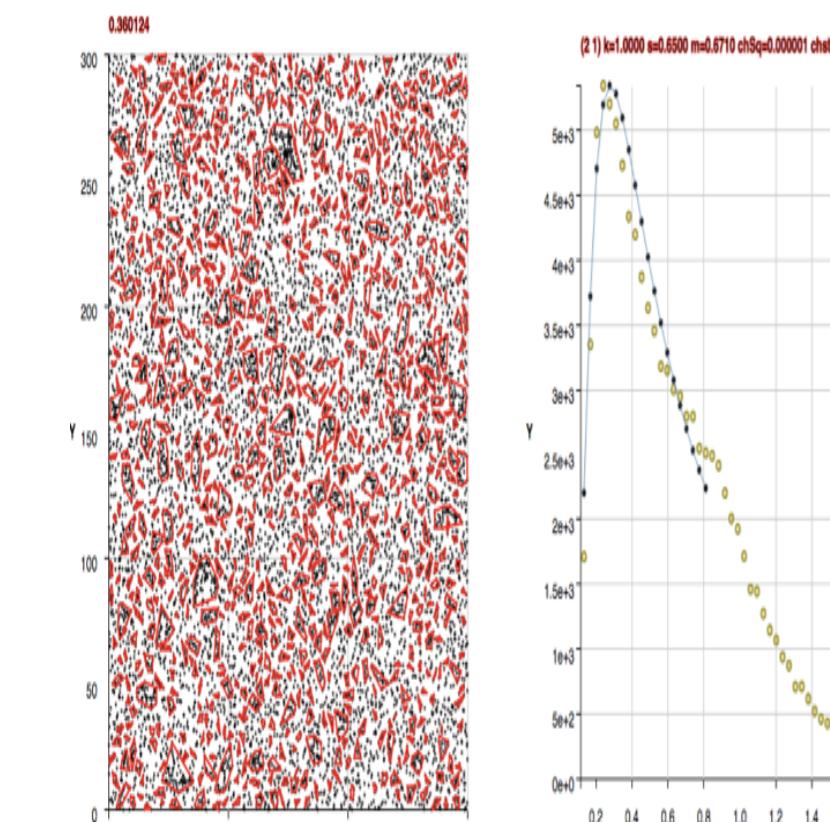


**critical density range**  
**0.55 through 0.65**

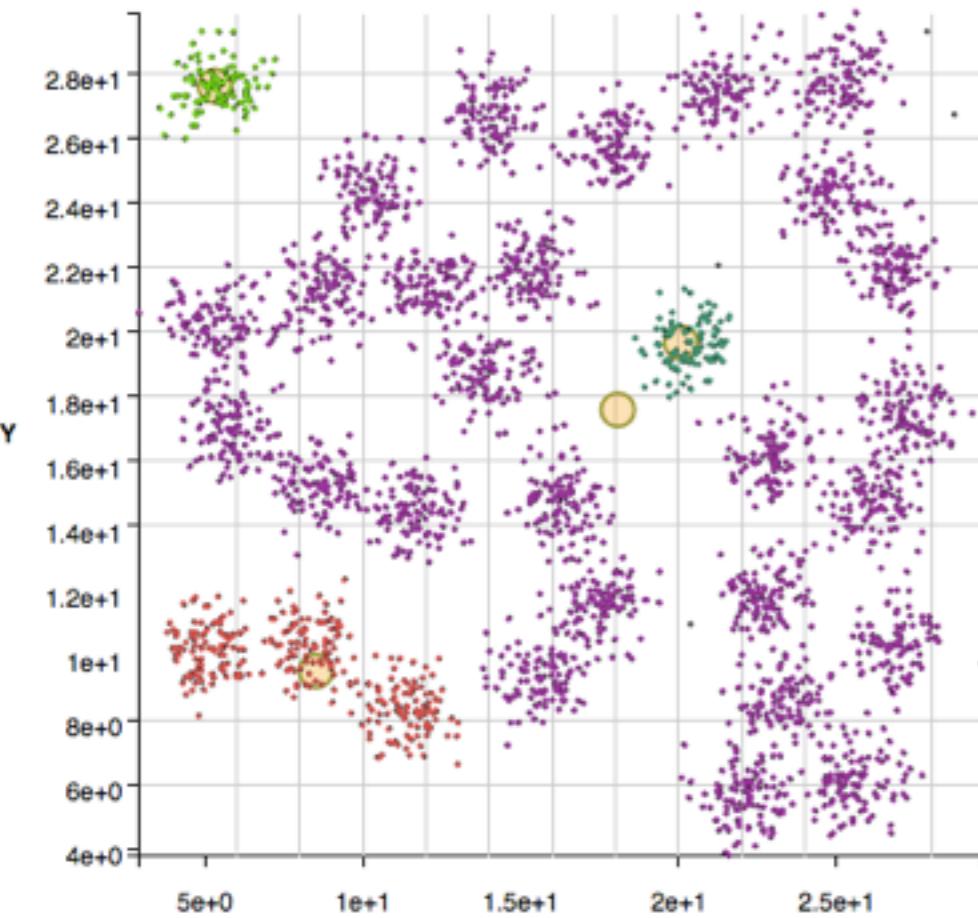




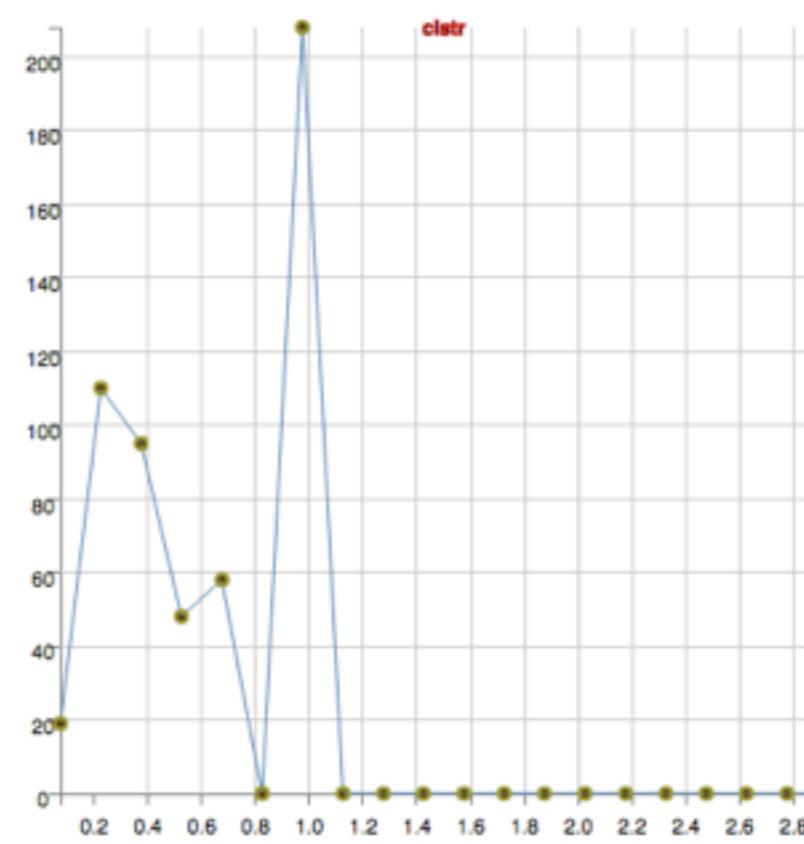
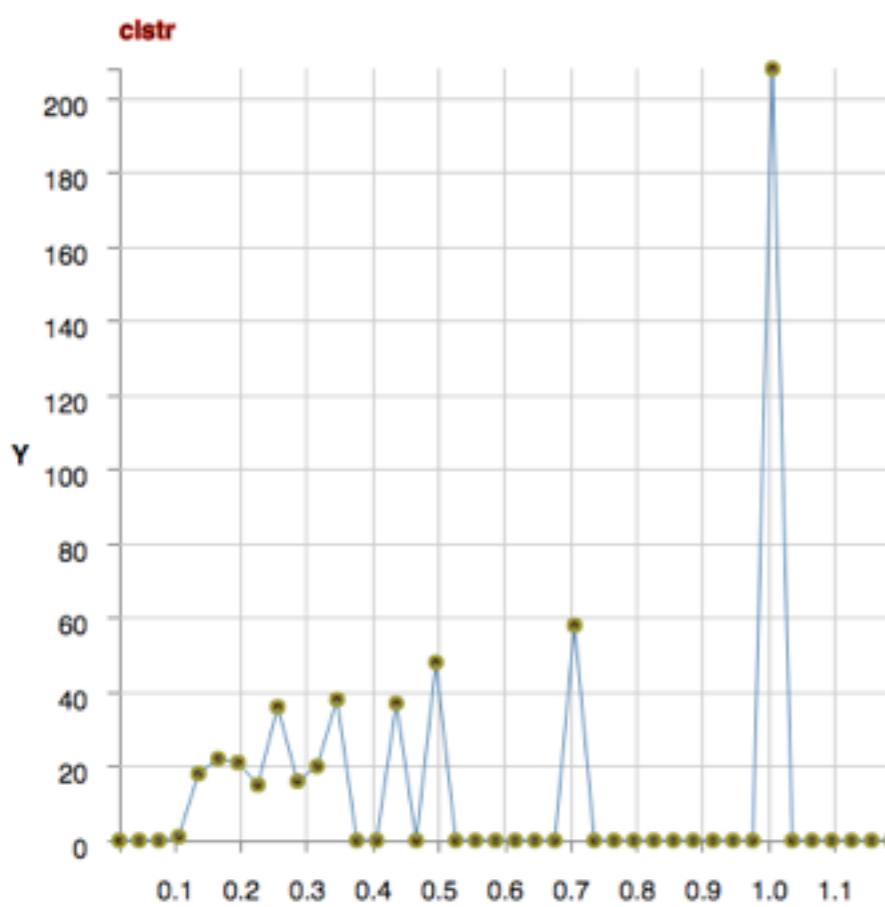
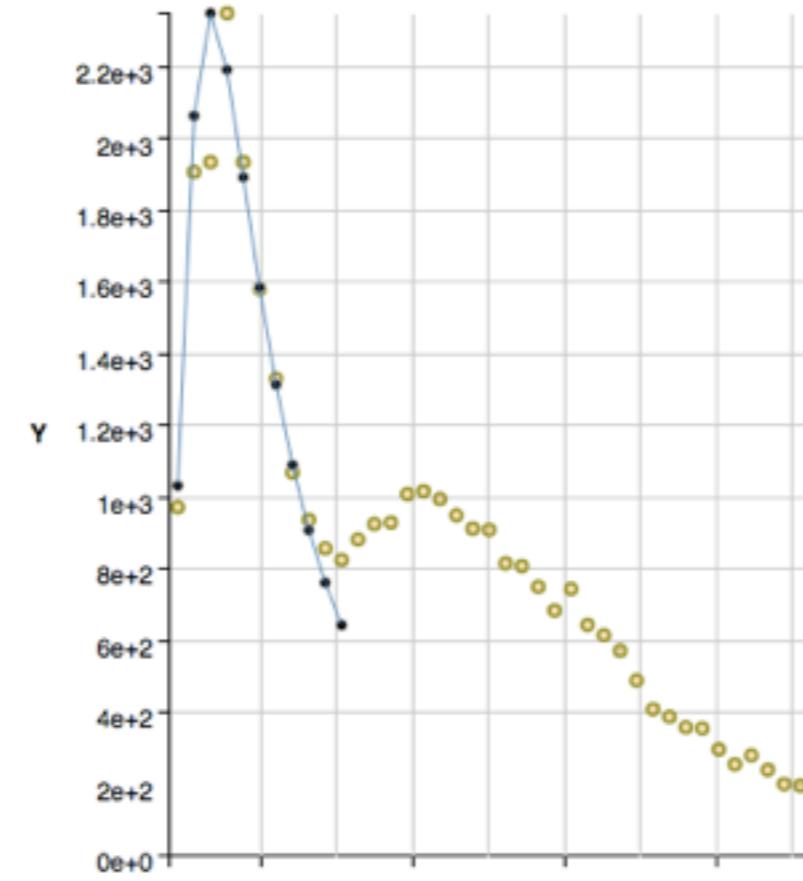
**critical density range**  
**0.25 through 0.7**



0.755488

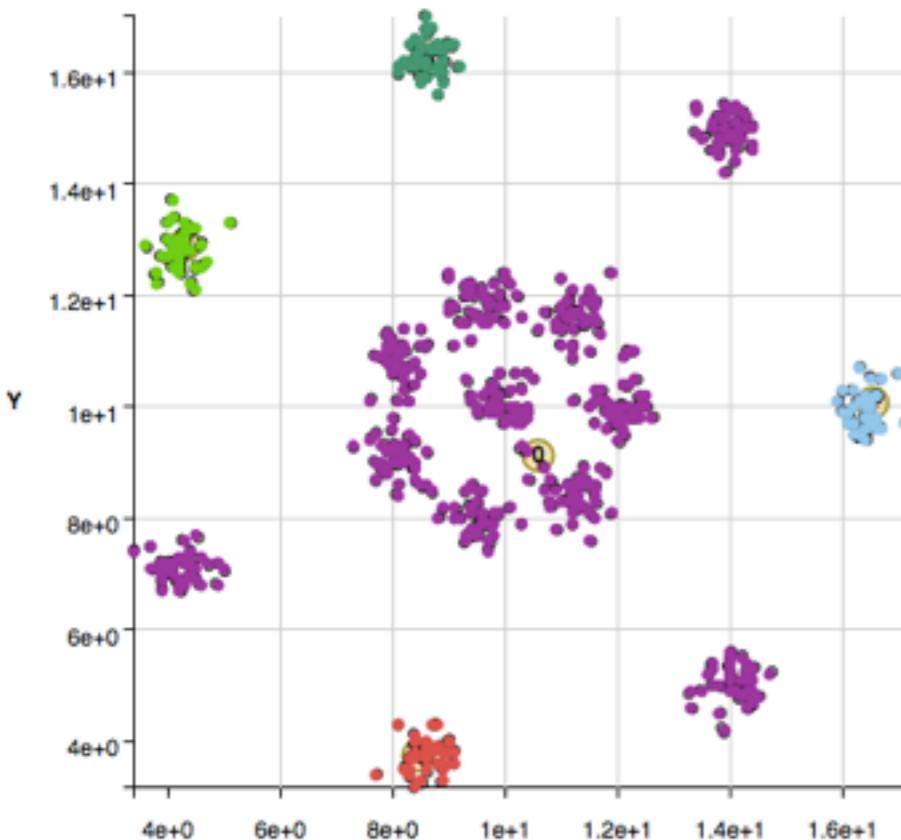


(3100) k=0.6000 sigma=0.2750 mu=0.5500 chst=0.8

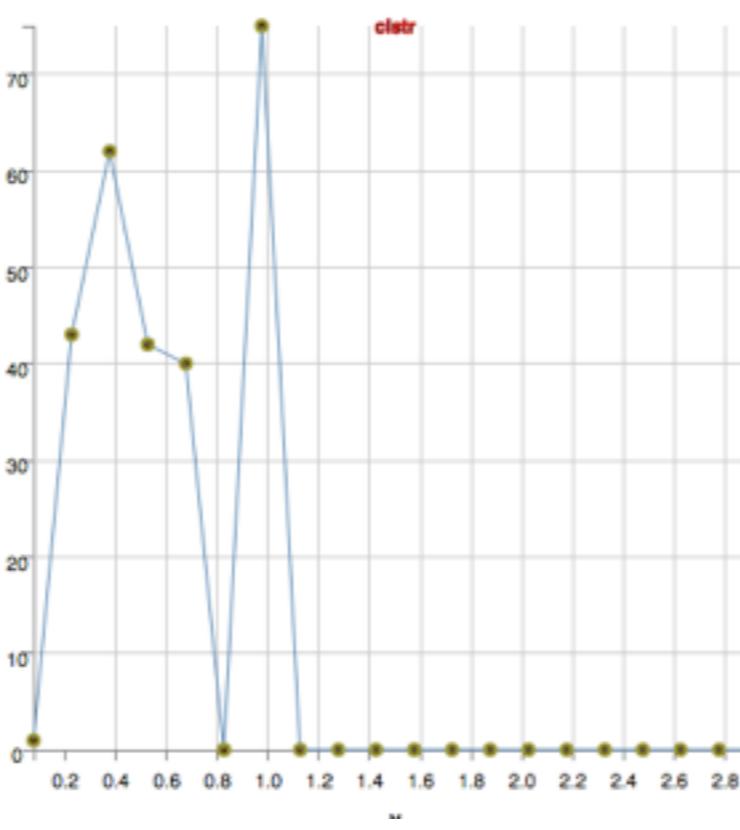
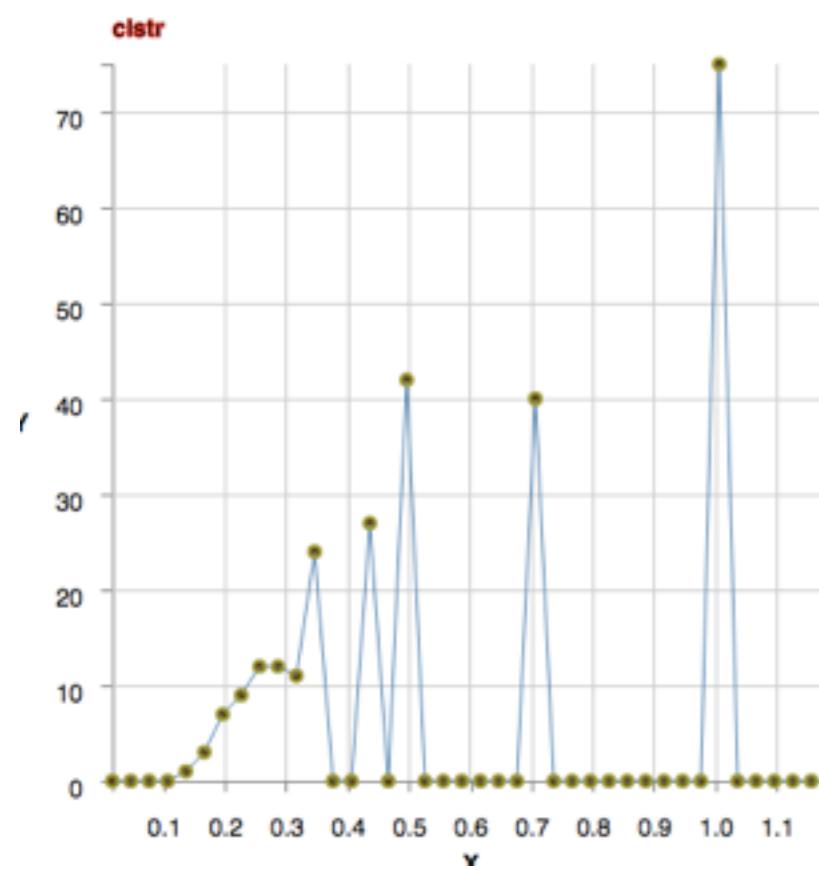
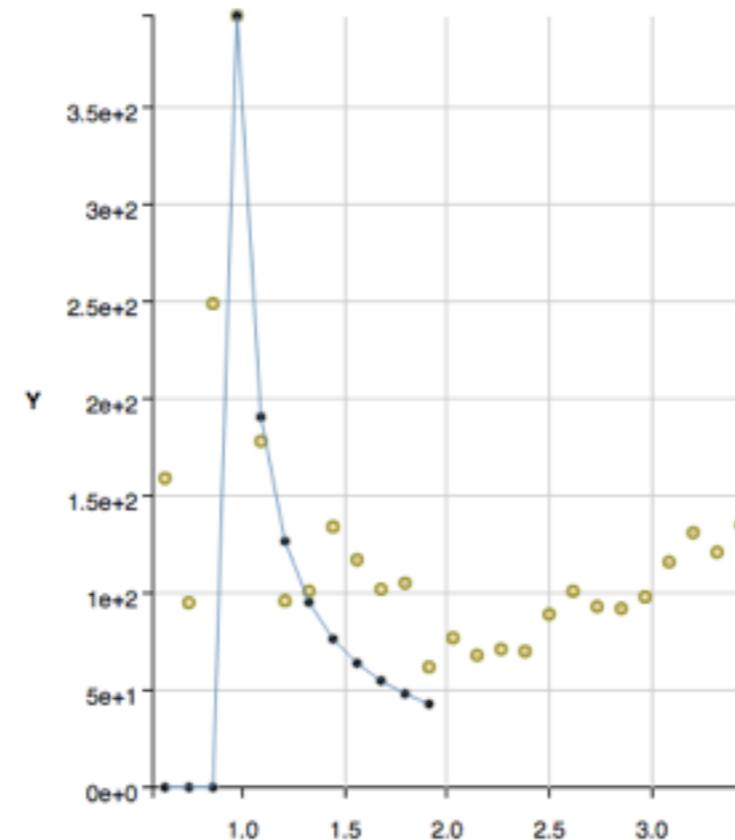


**critical density range**  
**0.8 through 1.75**

0.620603

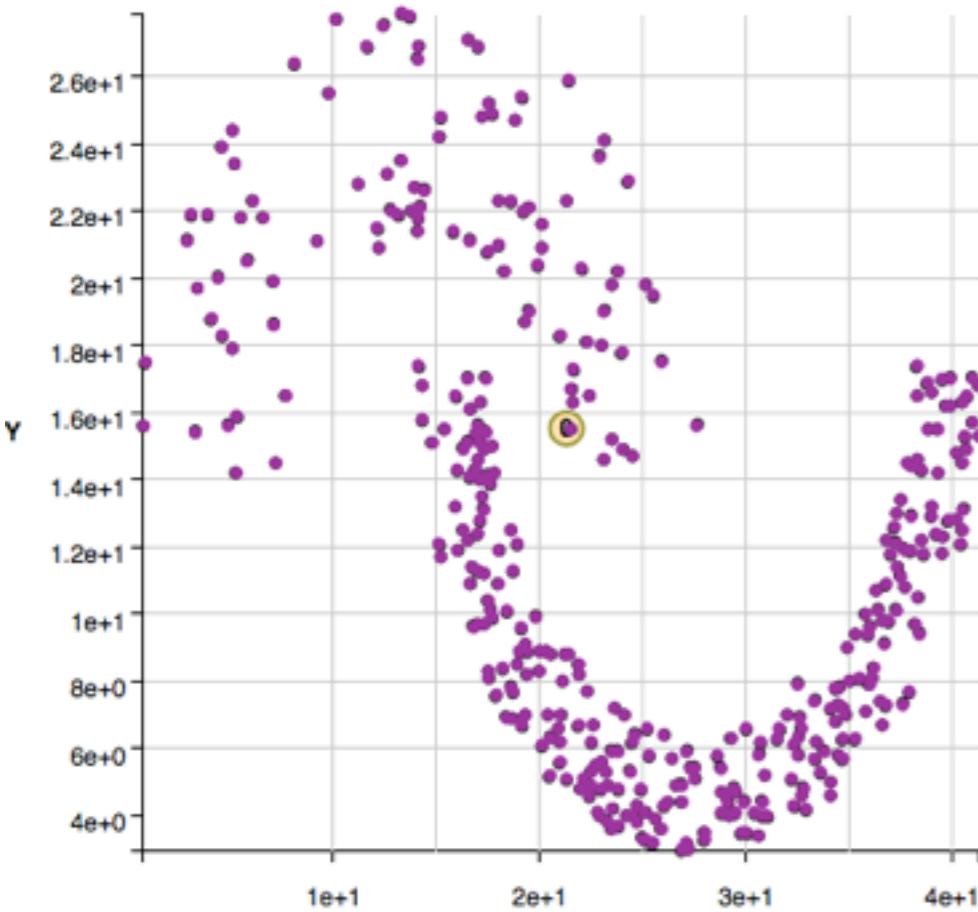


( 600) k=8.4083 sigma=55.0000 mu=7.0000 chst=1.0

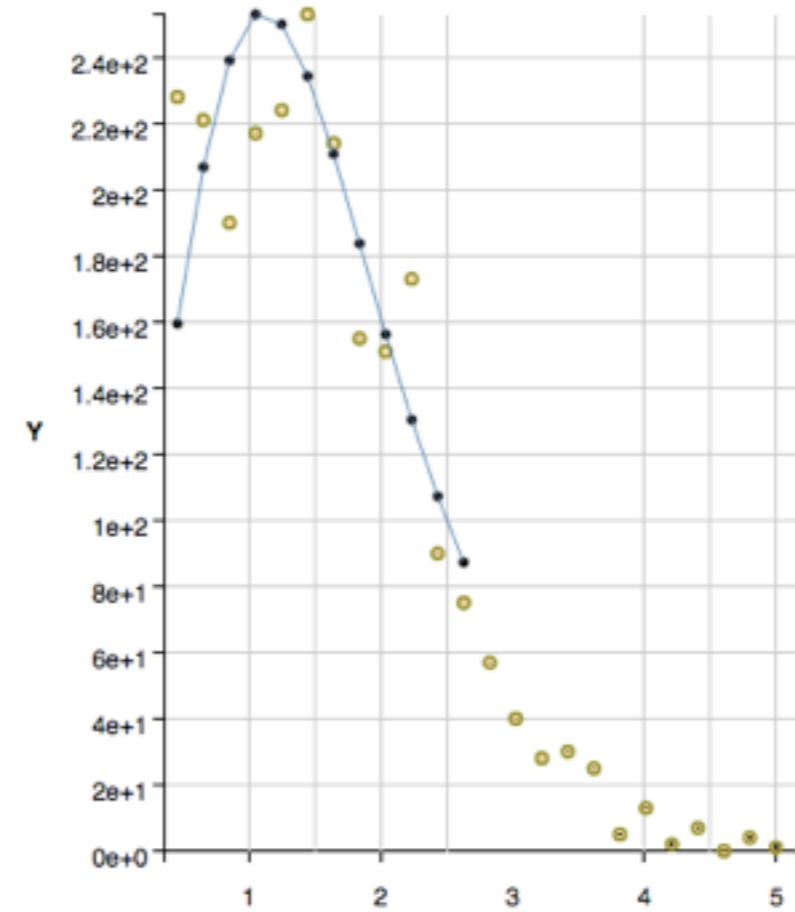


**critical density range**  
**0.3 through 1.3**

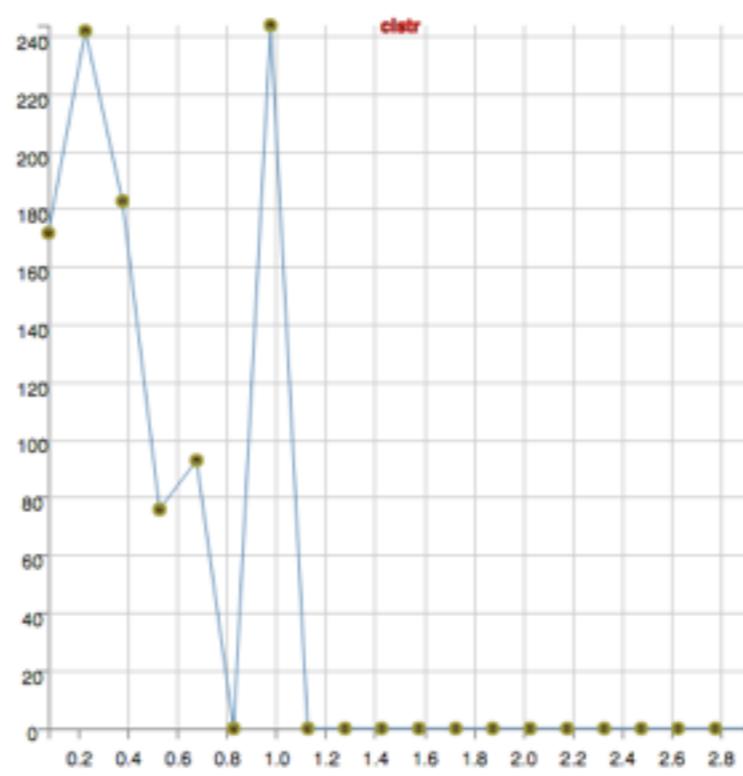
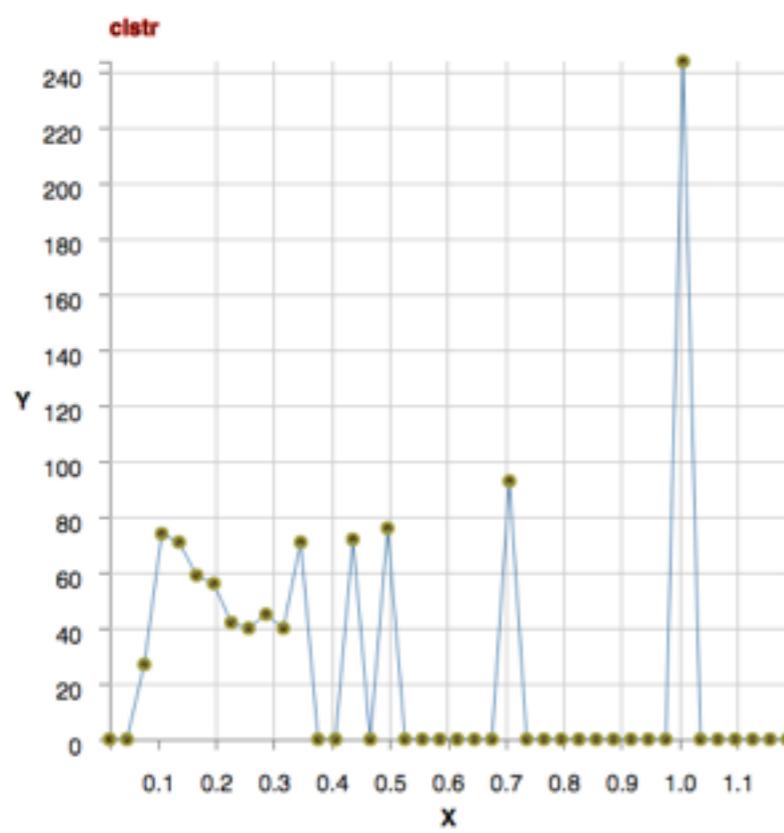
0.459889

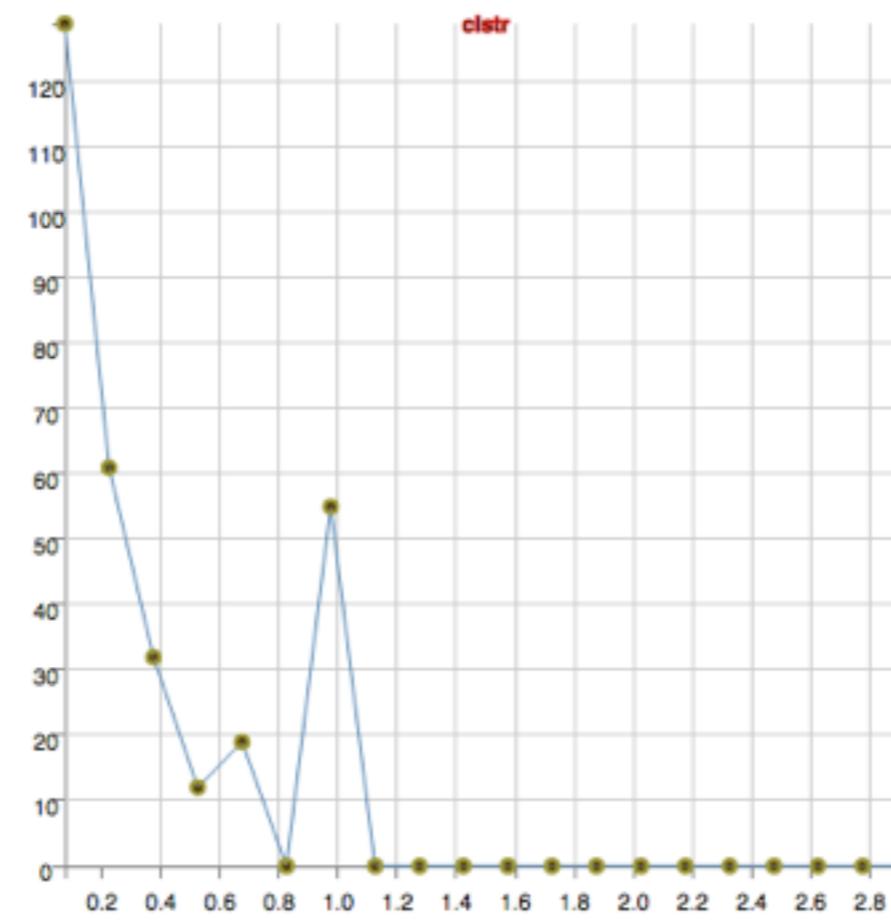
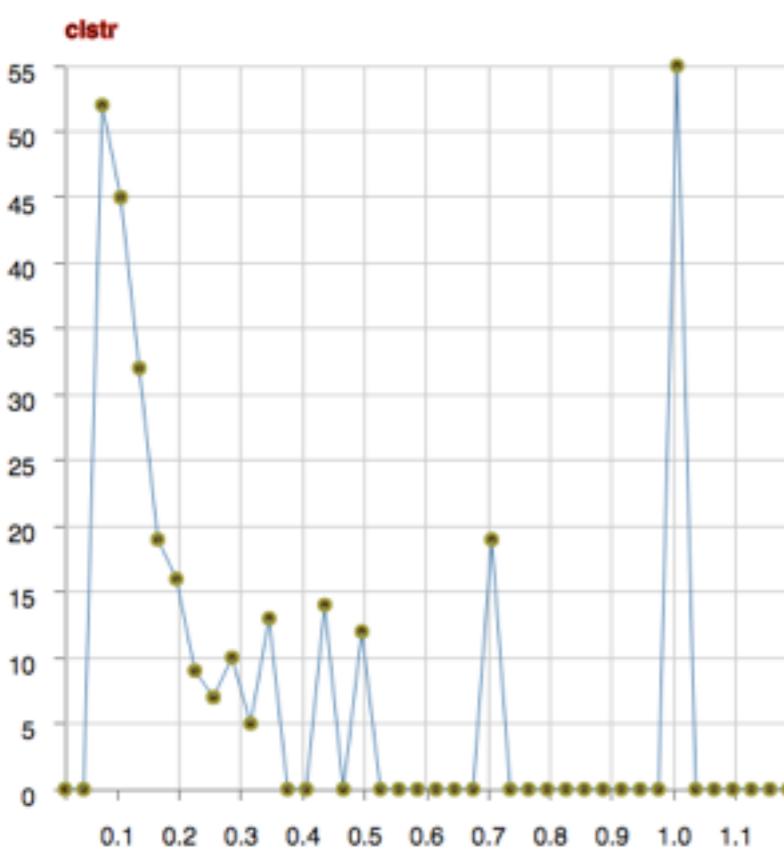
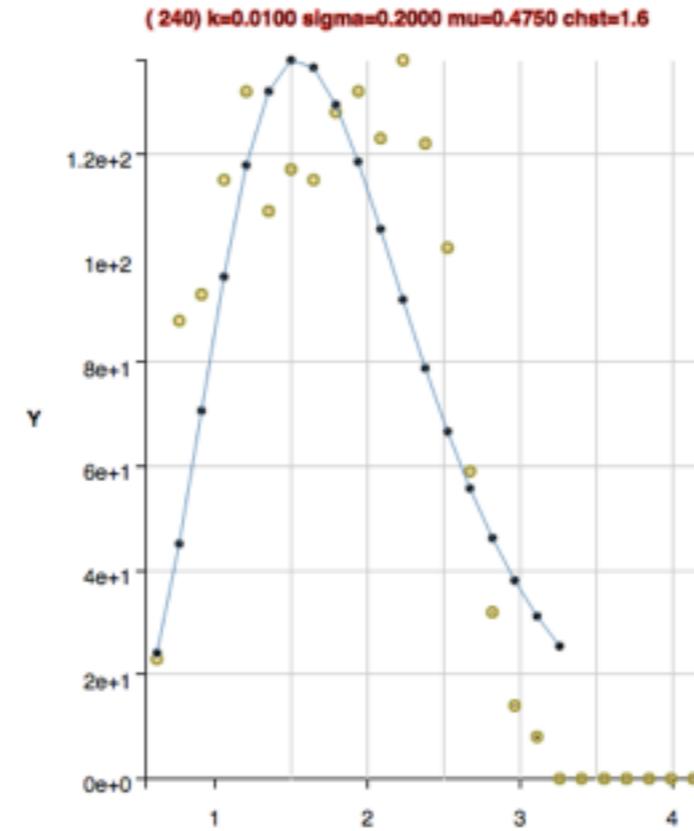
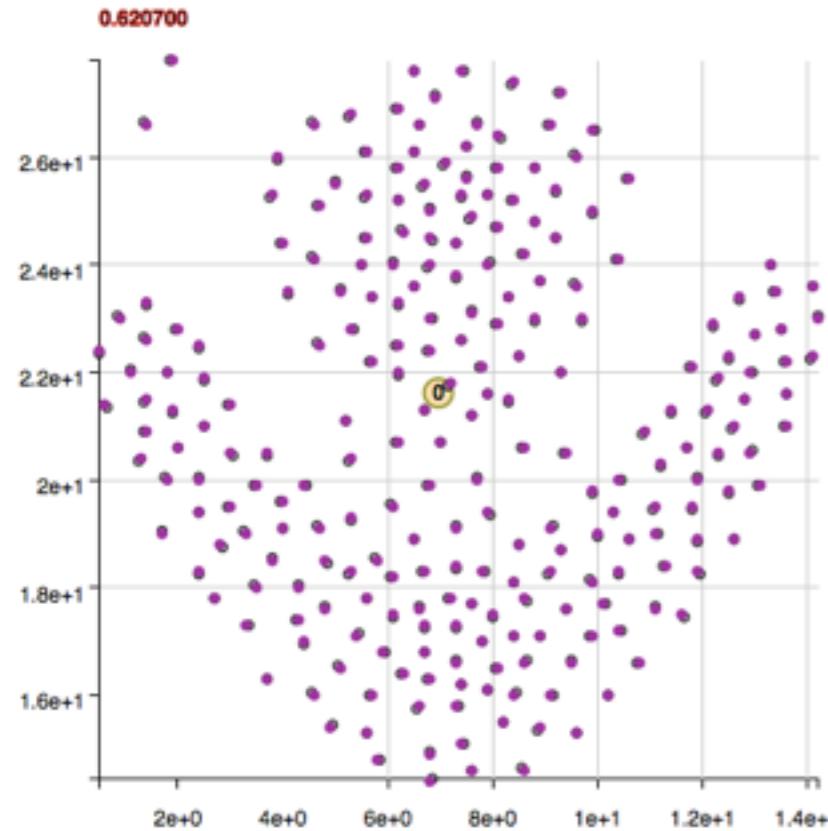


( 373 ) k=0.0100 sigma=0.3000 mu=0.4250 chst=1.2



critical density range  
0.325 through 0.05

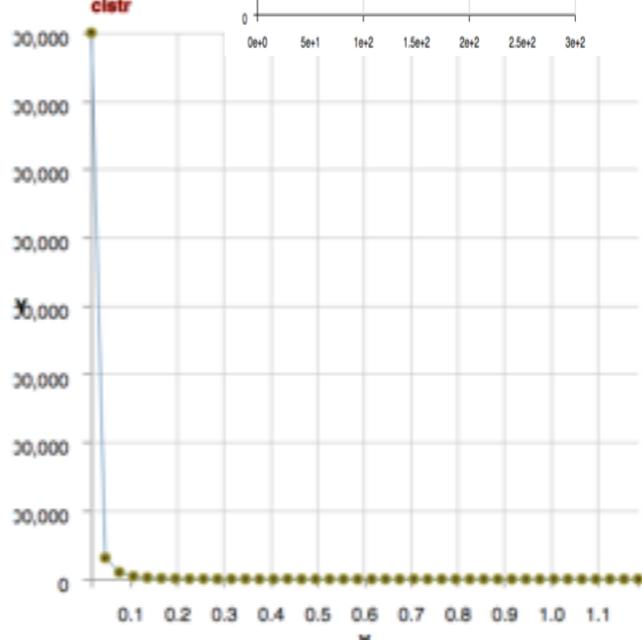
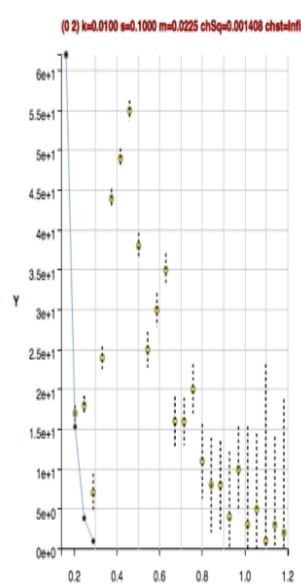
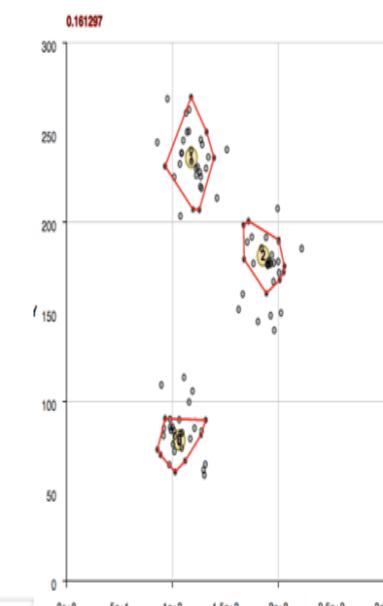
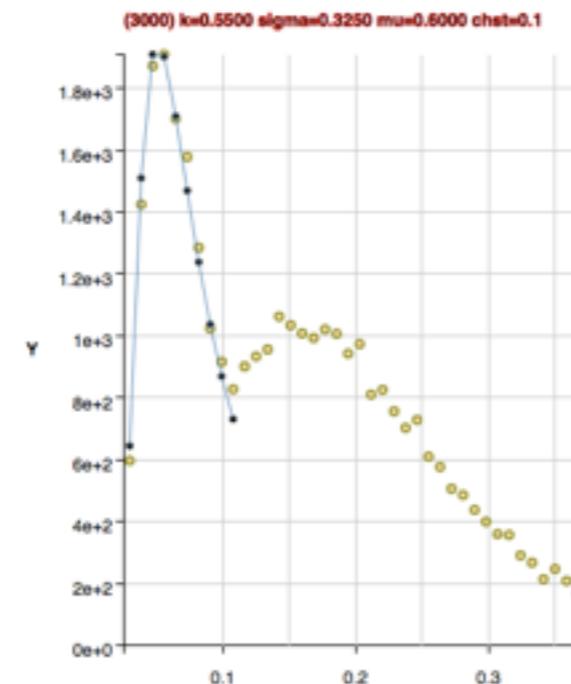
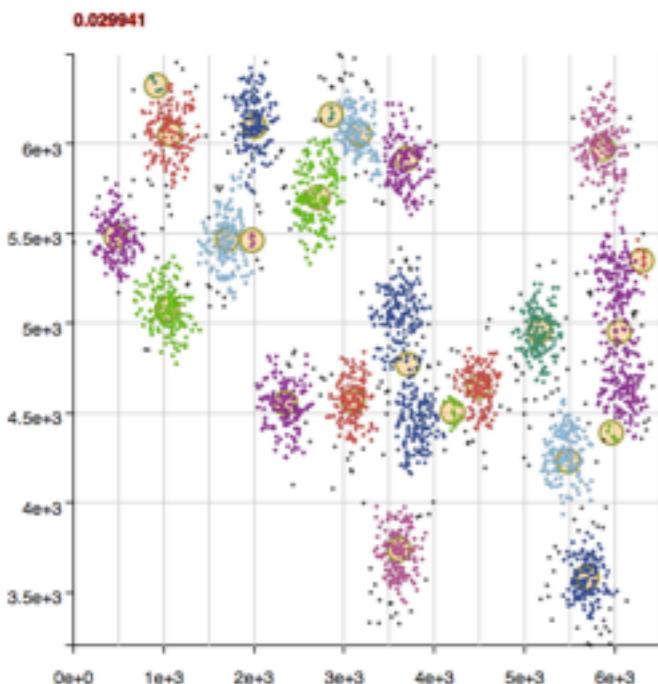
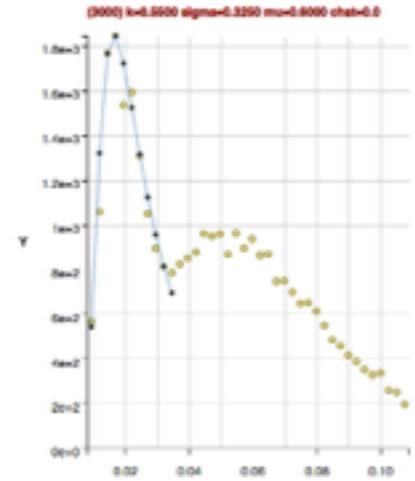
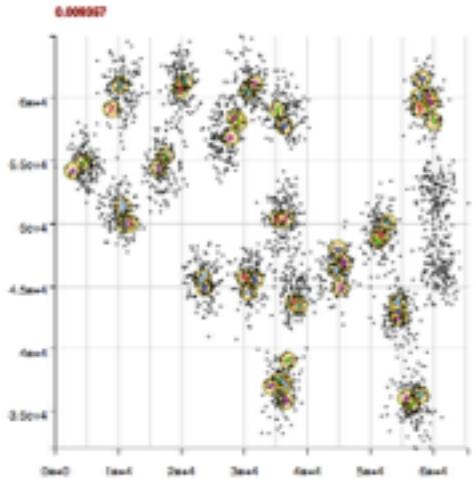




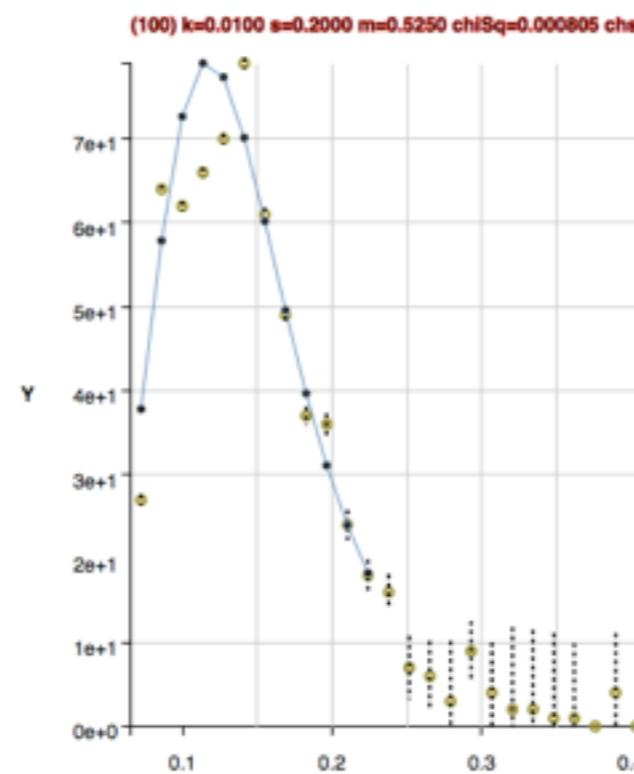
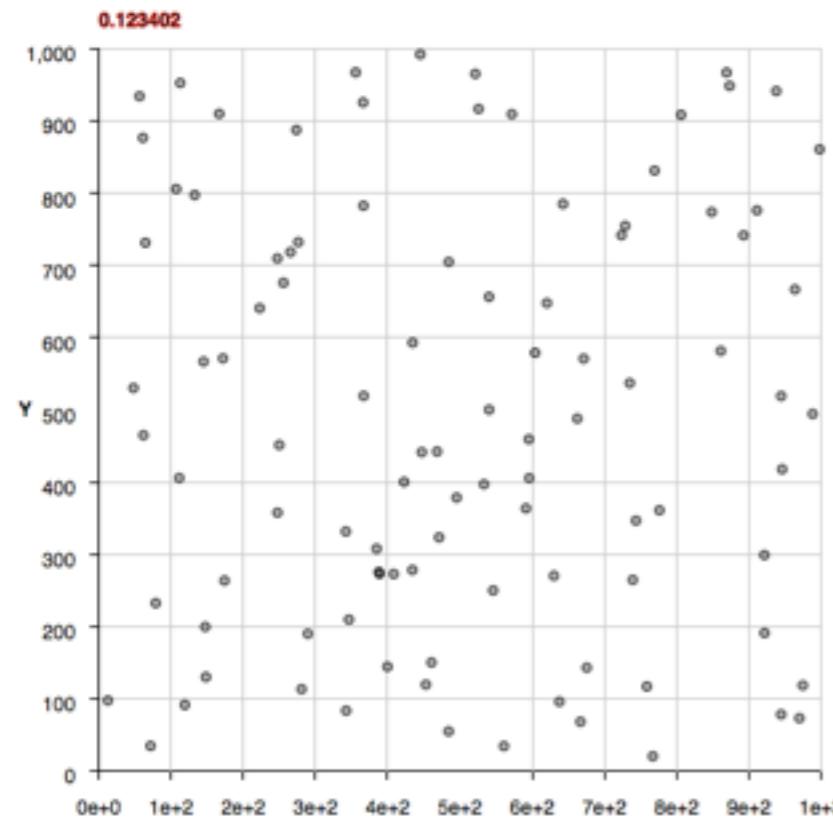
critical density range 0.  
through 0.95

for sep into 2 d=1.0

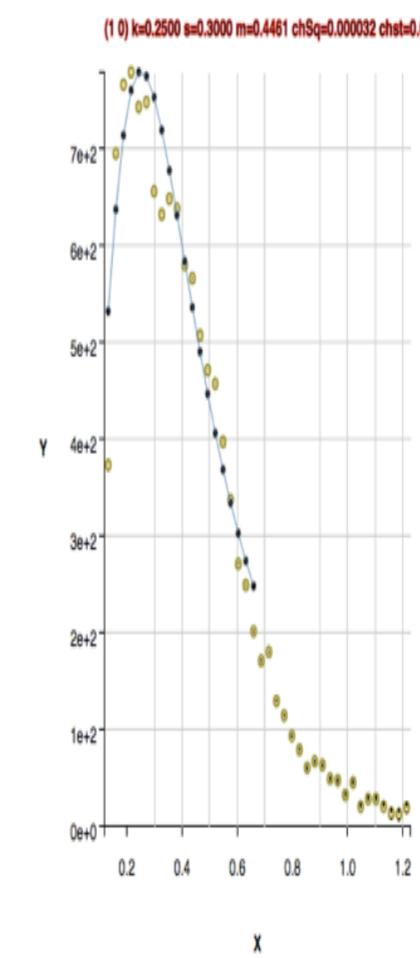
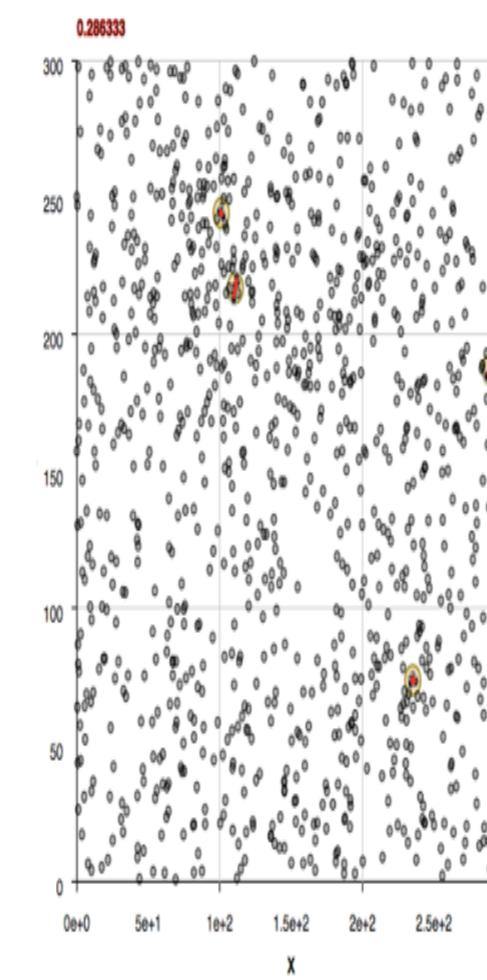
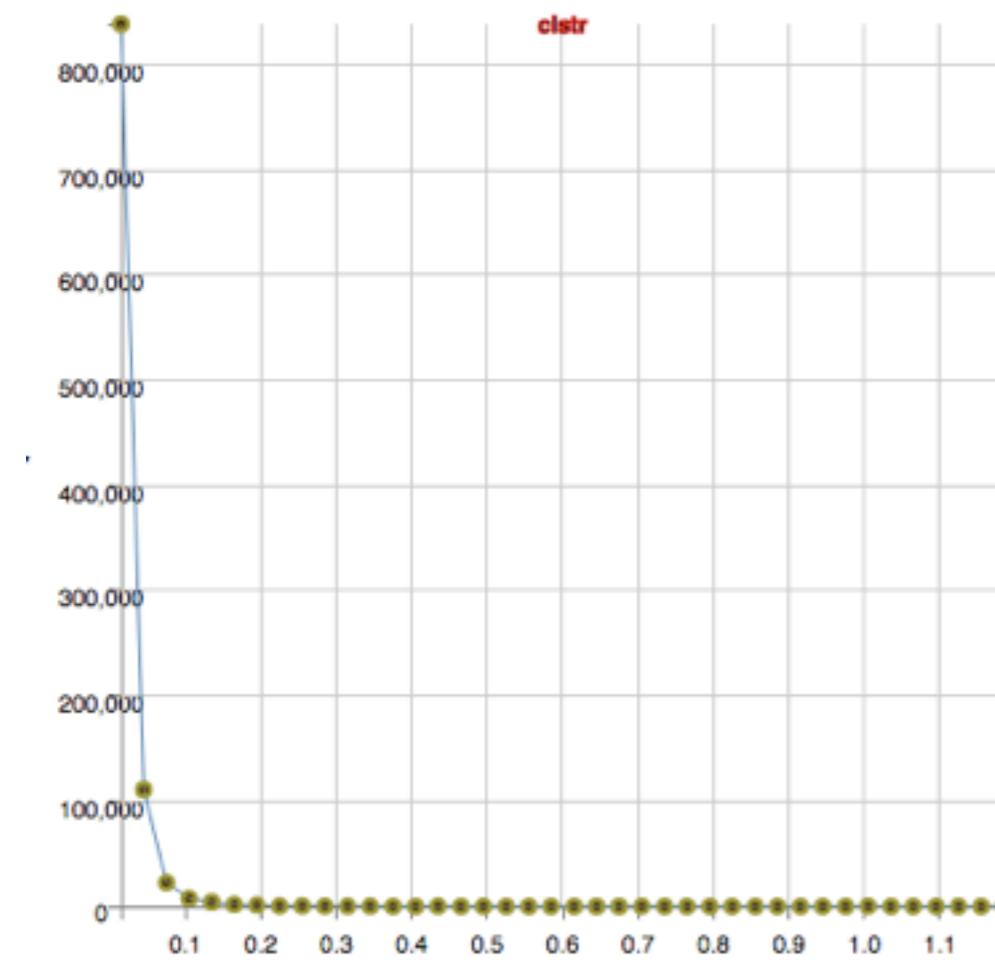
**critical density range**  
**0.0 through 0.01**



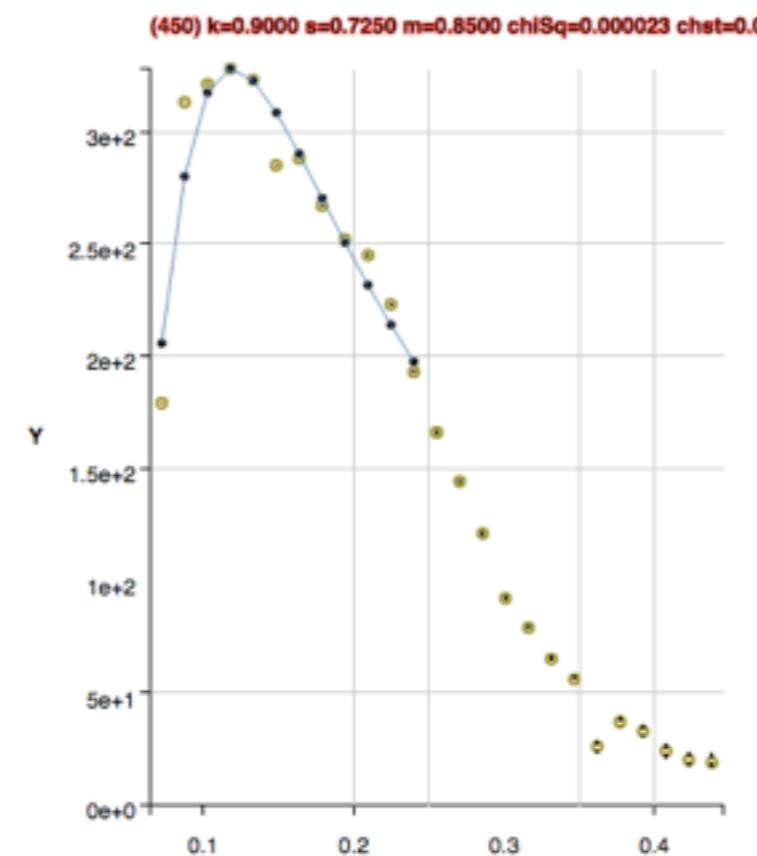
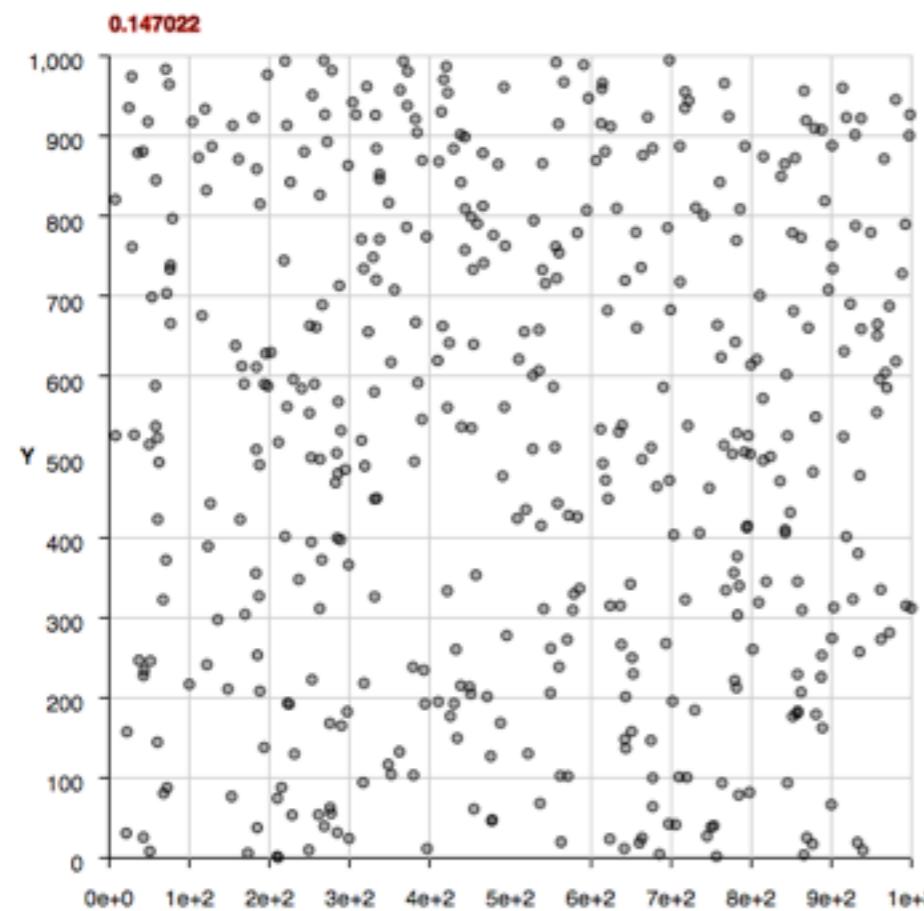
no clusters



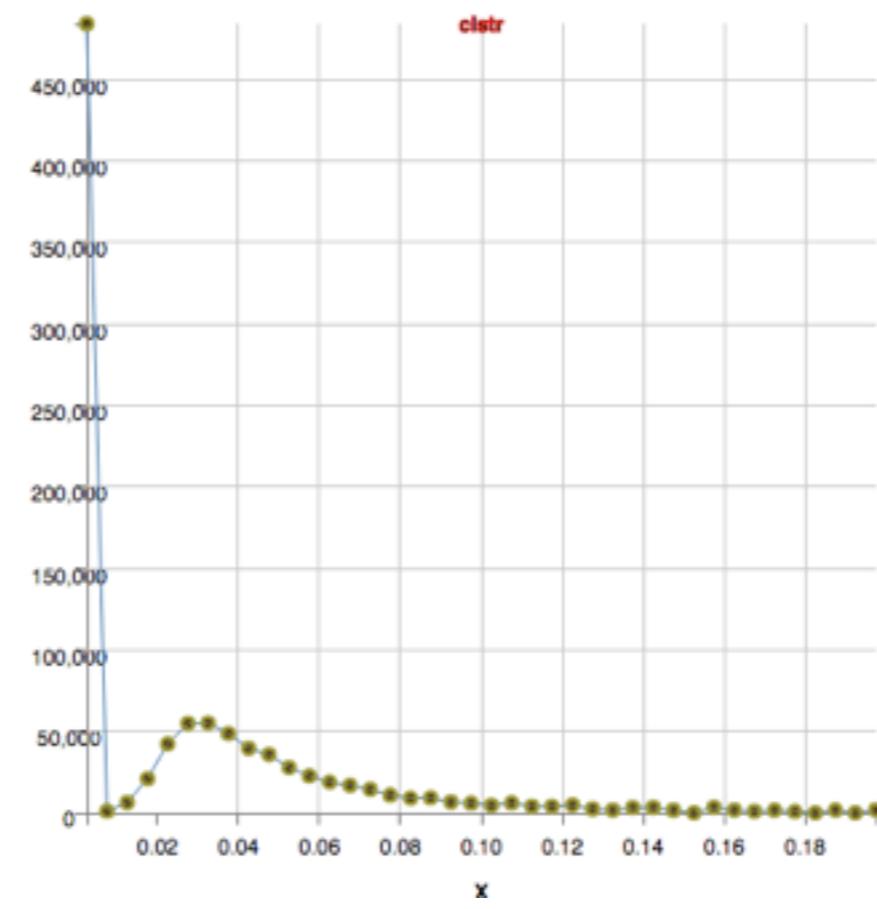
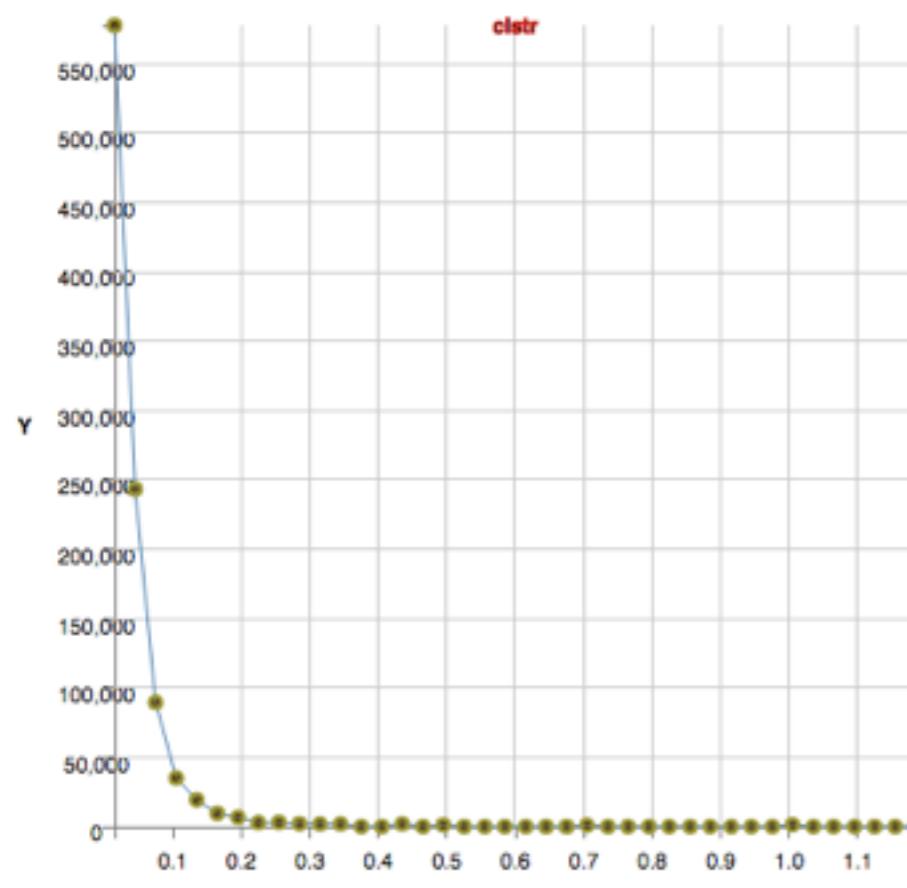
**critical density range**  
**0.025 through inf**



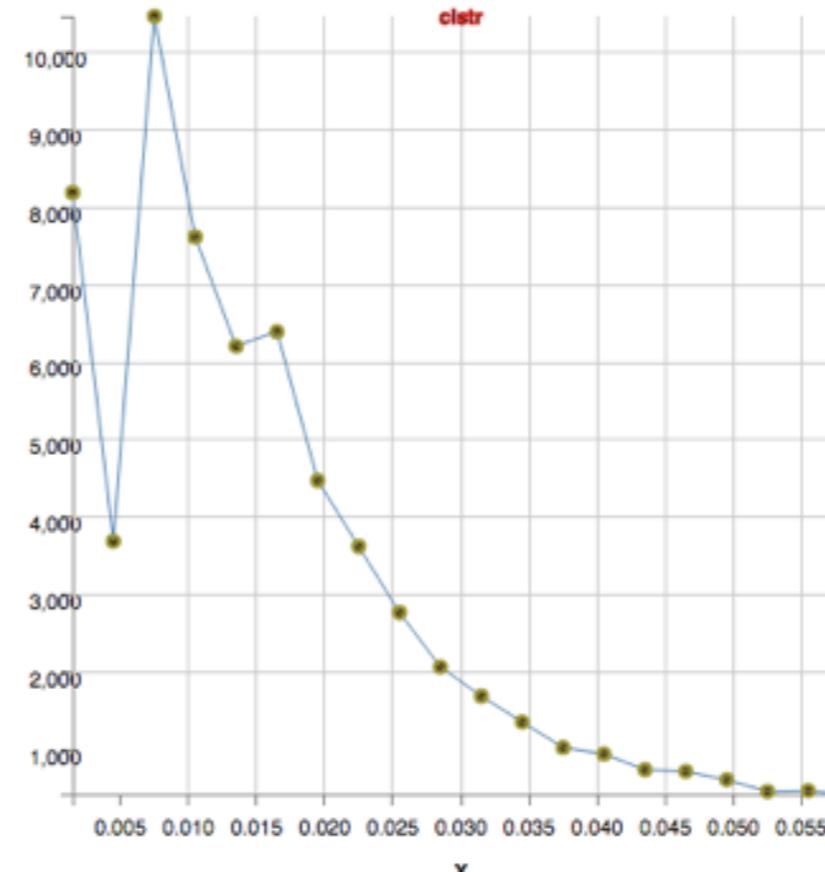
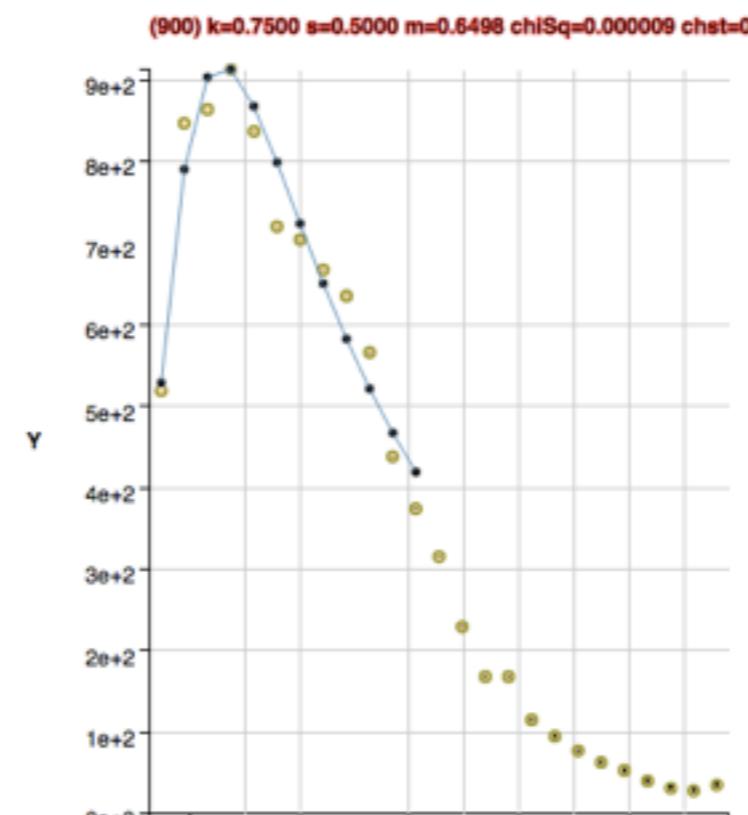
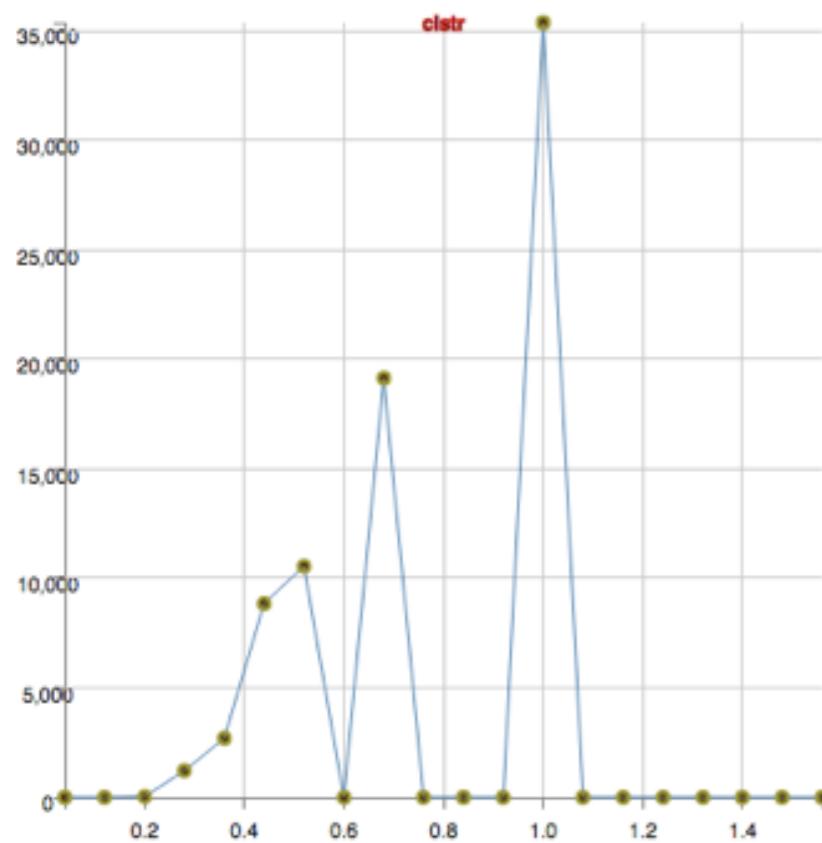
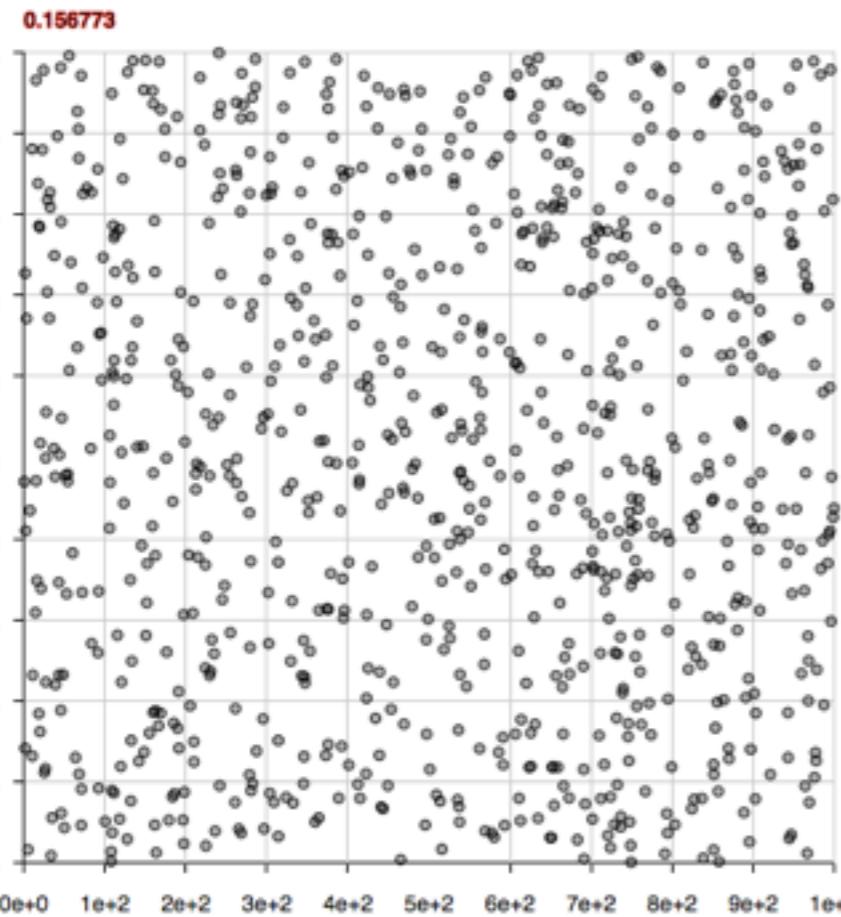
no clusters



**critical density range**  
**0.06 through inf**

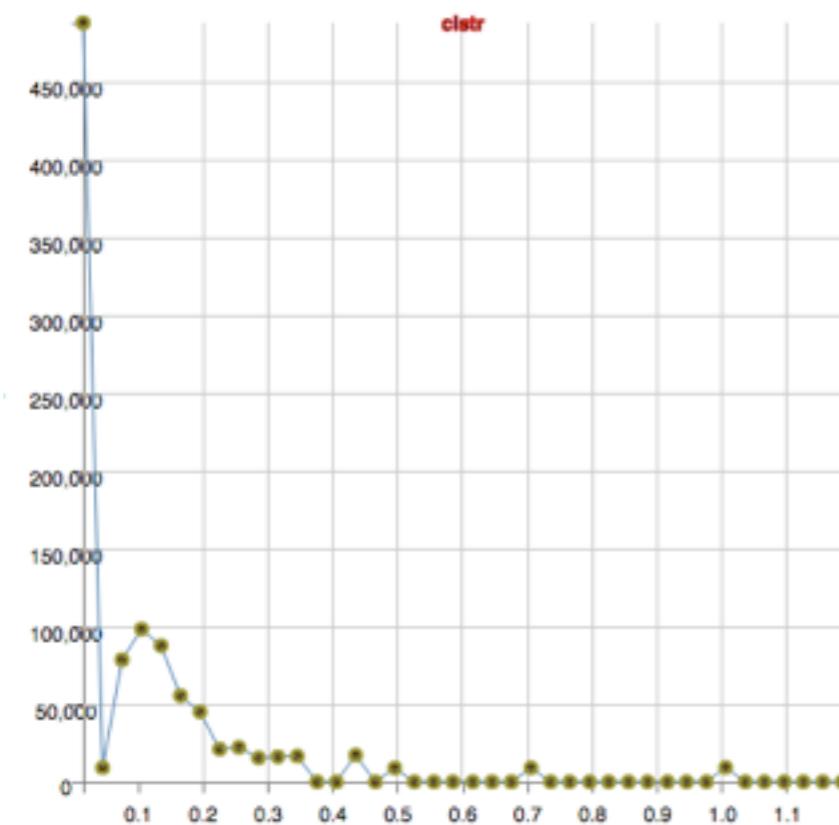
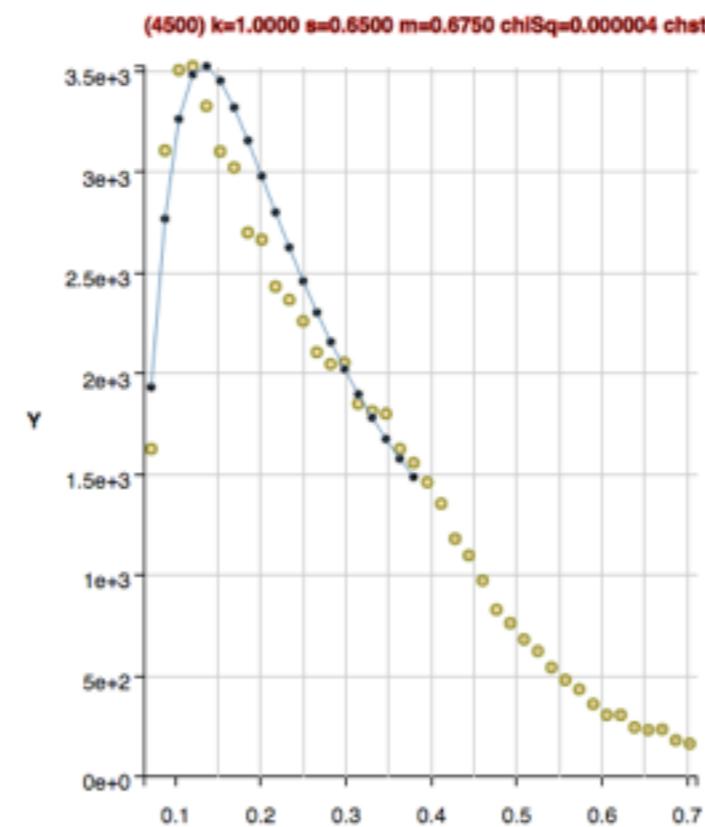
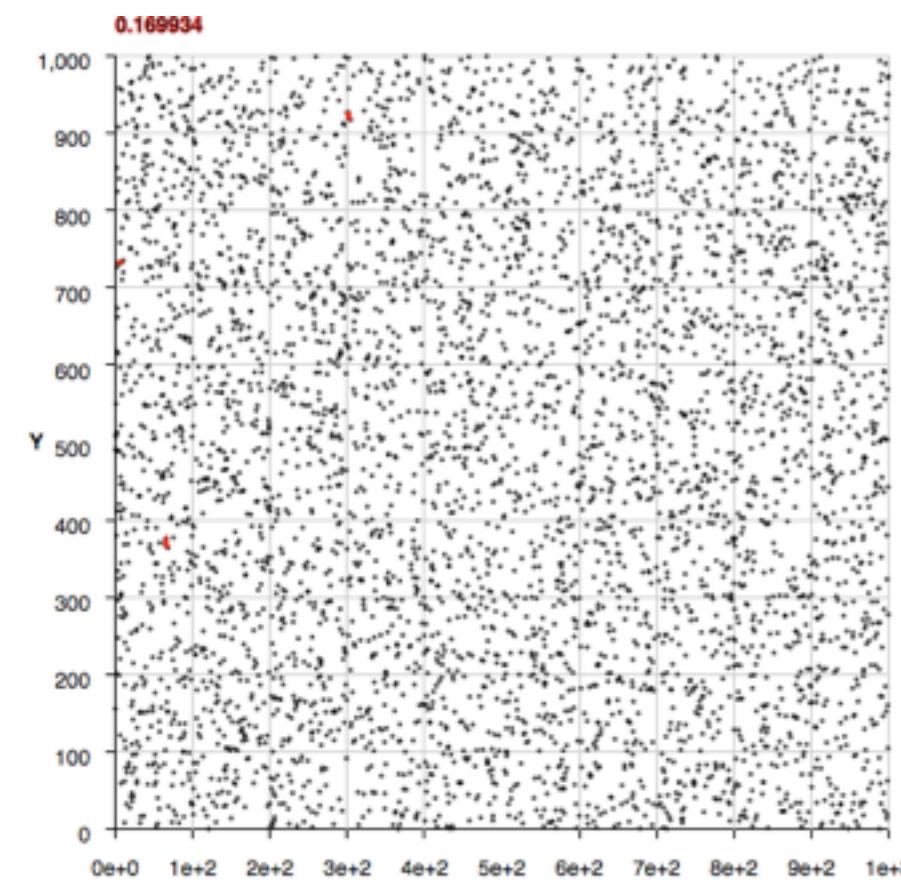


no clusters



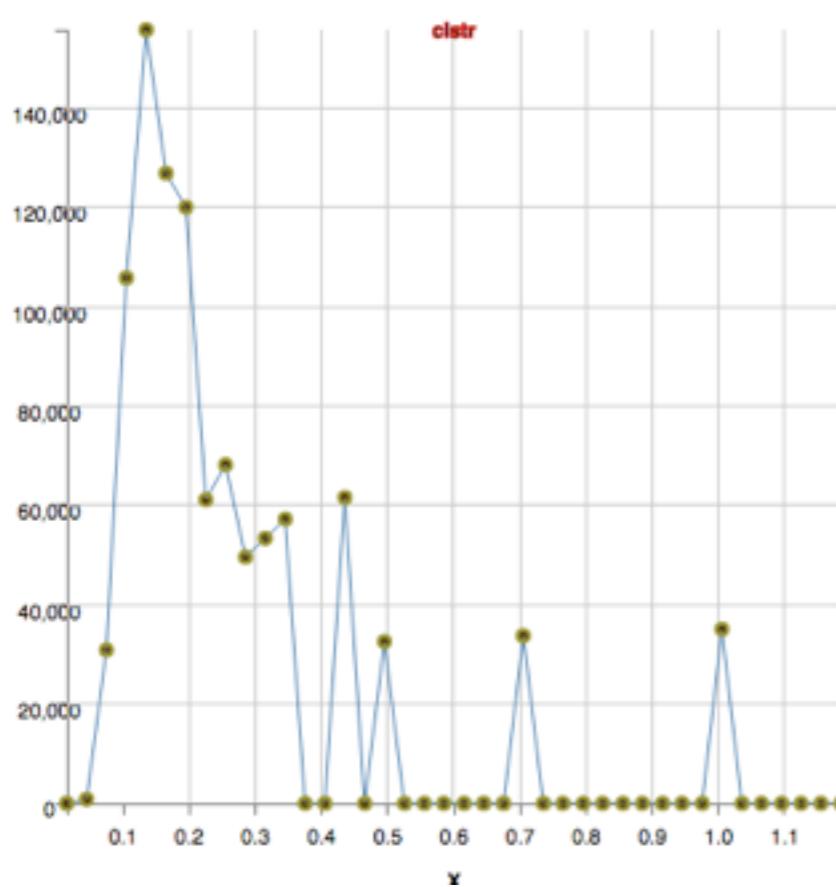
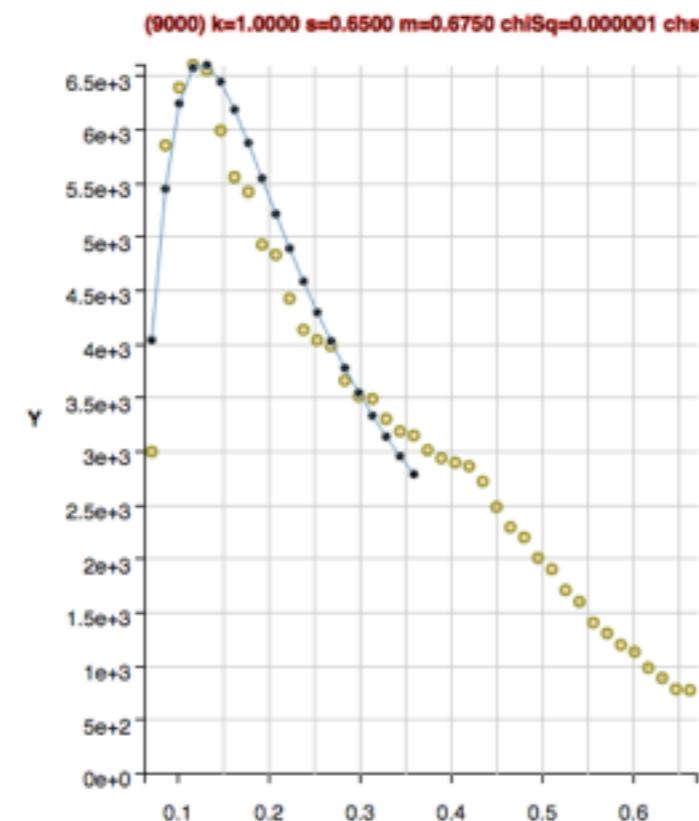
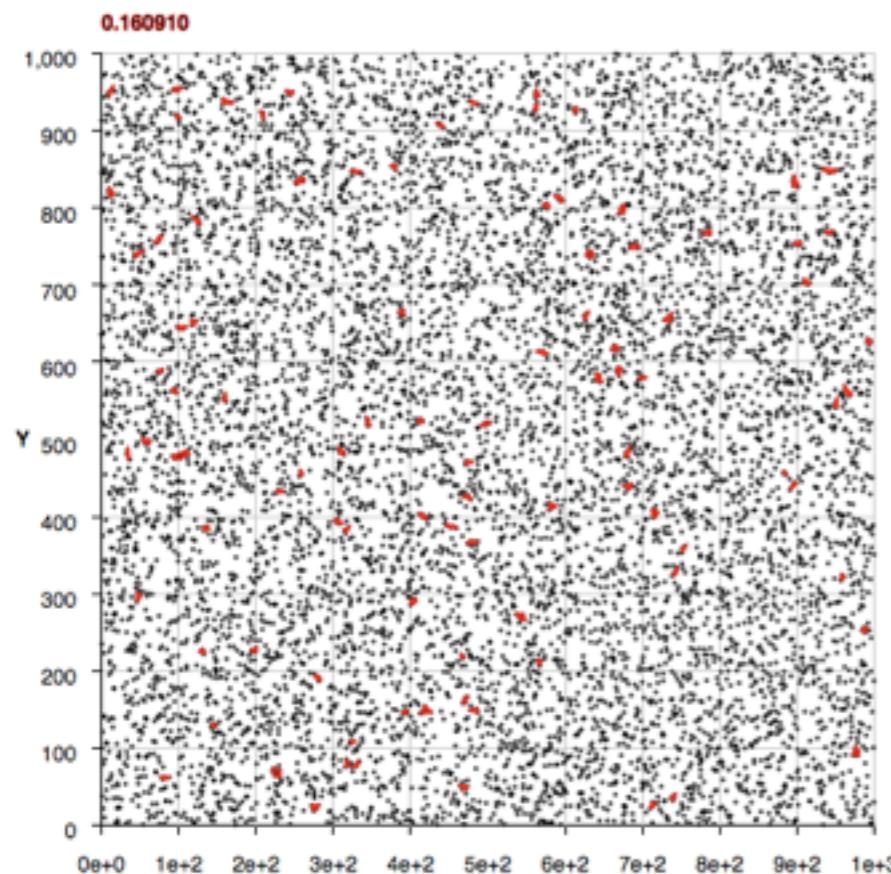
critical density range  
0.07 through inf

no clusters



**critical density range**  
**0.15 through inf**

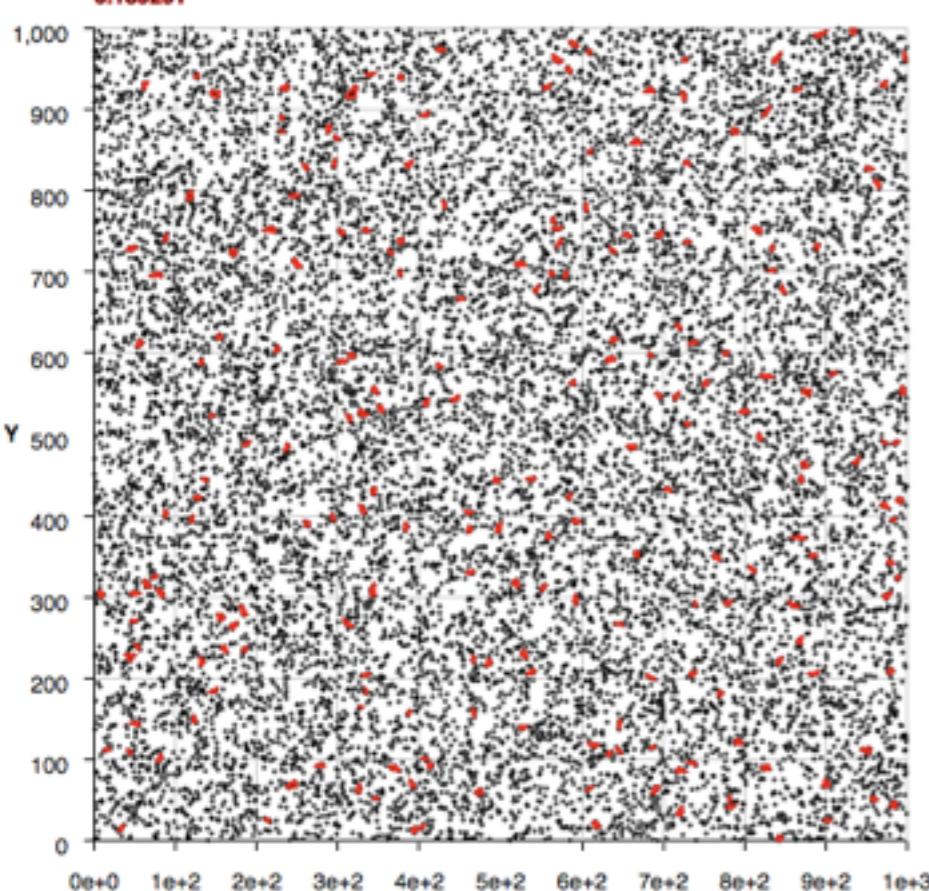
no clusters



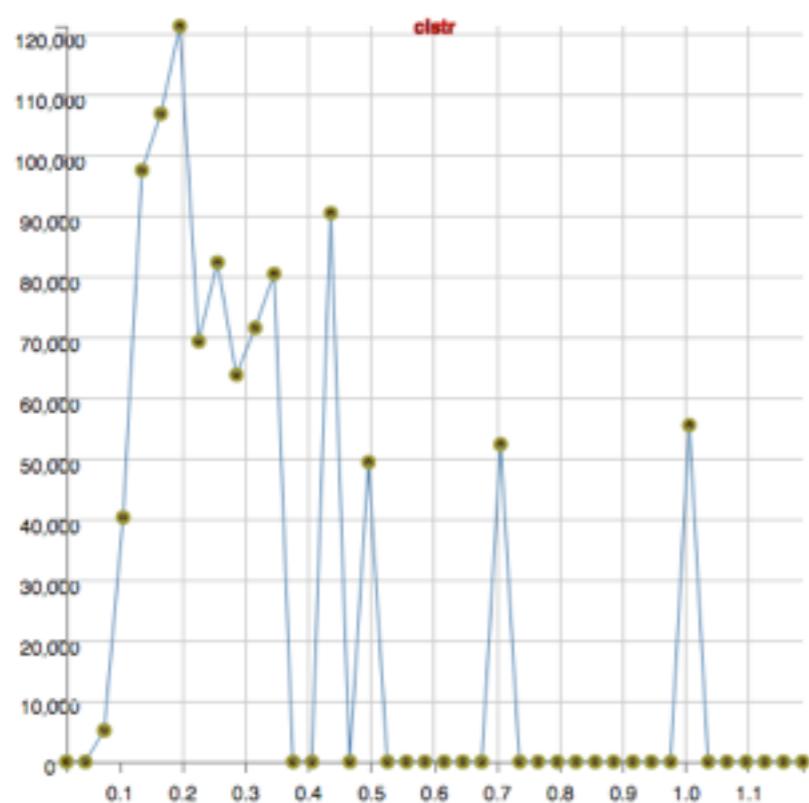
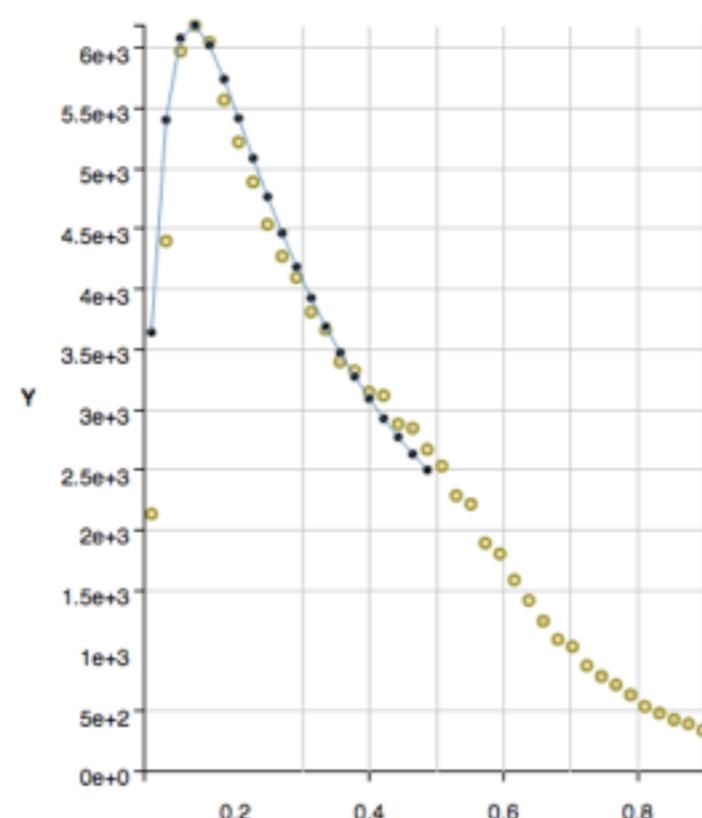
critical density range  
0.18 through inf

no clusters

0.189291

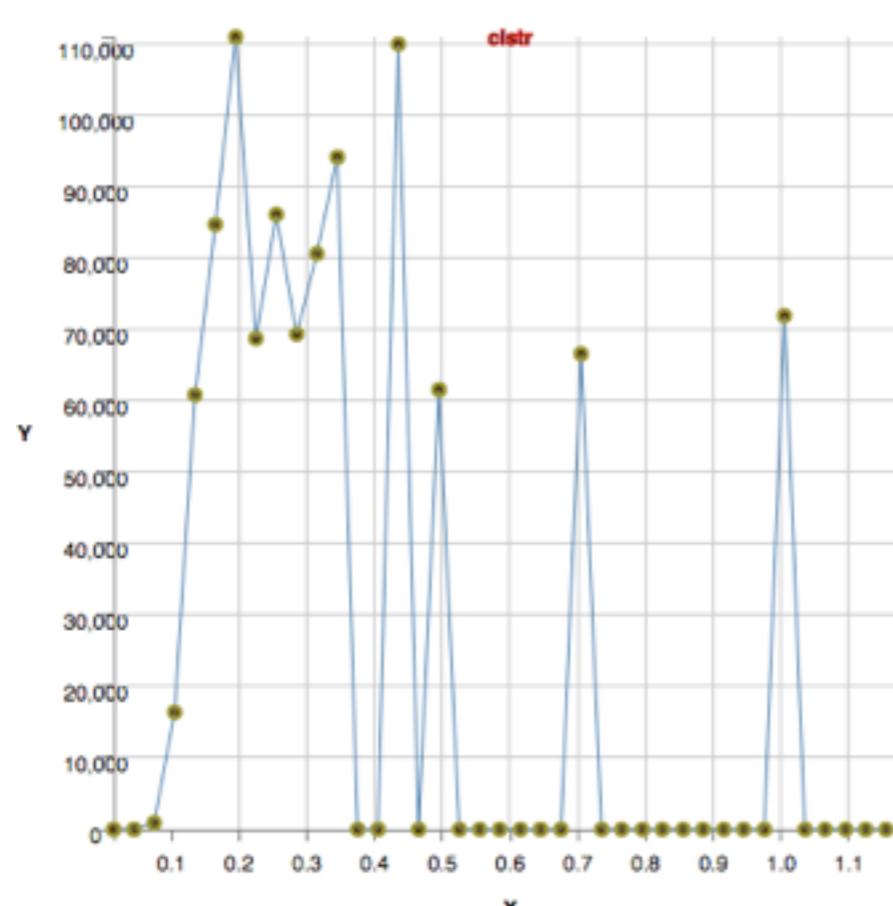
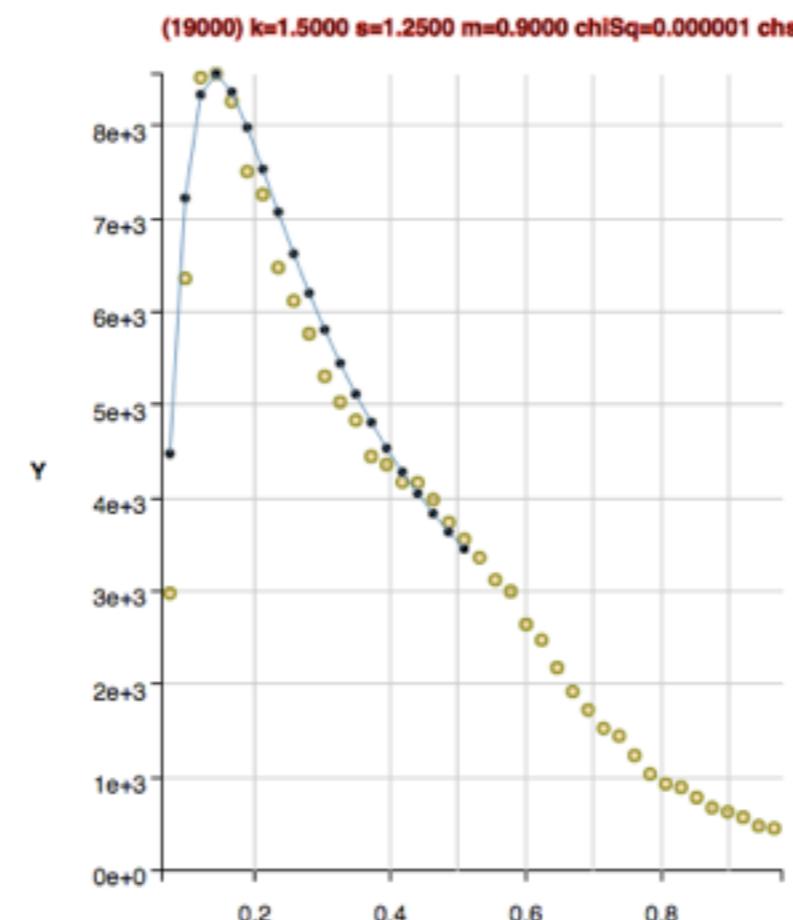
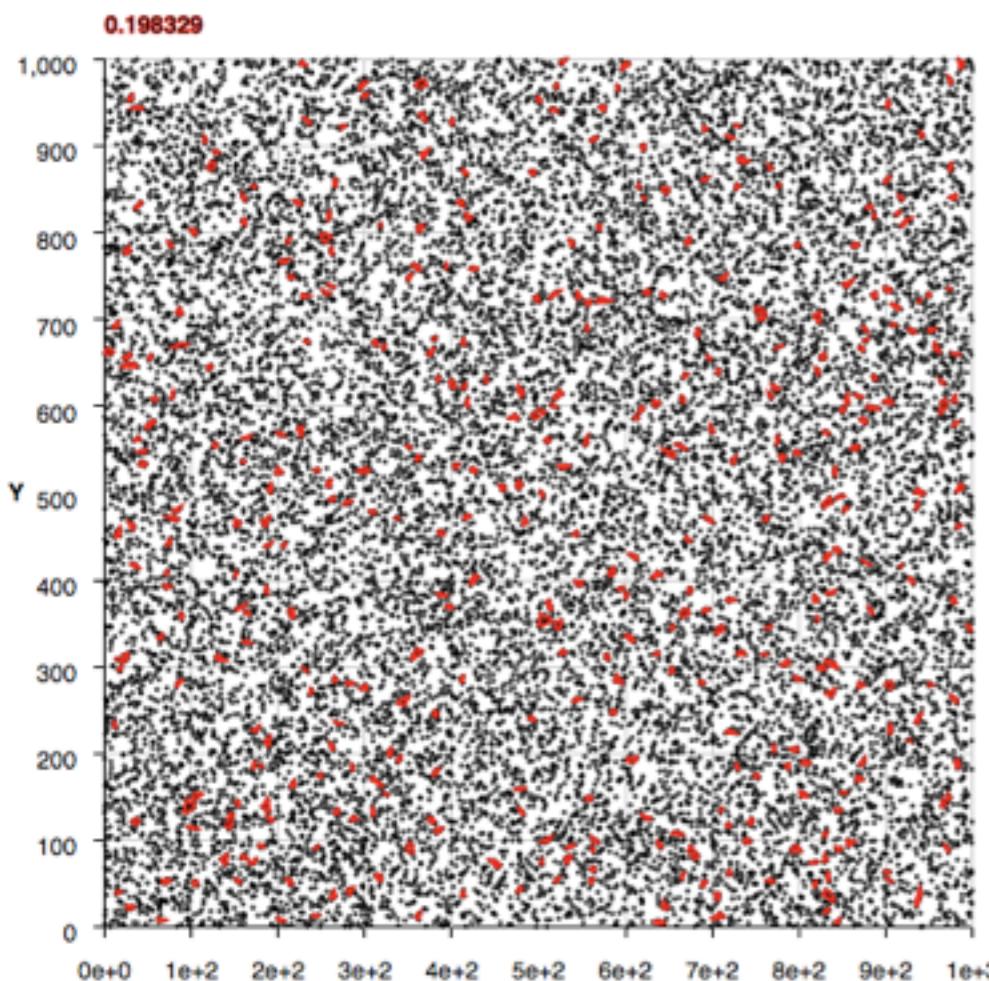


(14500) k=1.5000 s=1.2500 m=0.9000 chISq=0.000001 chst=0.



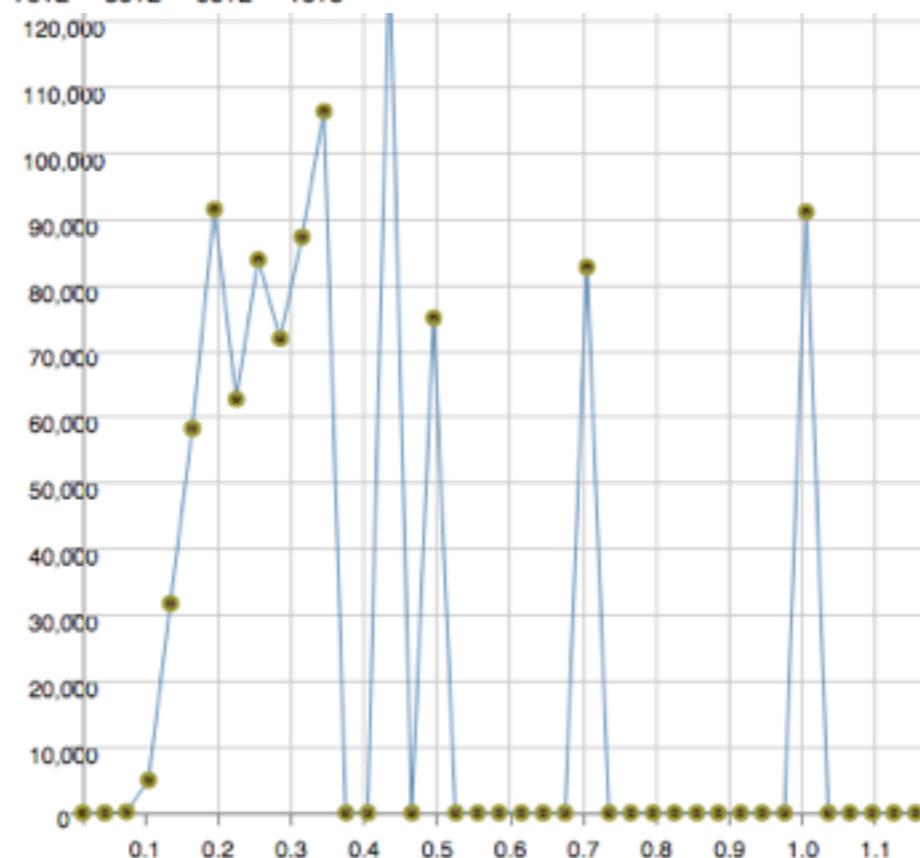
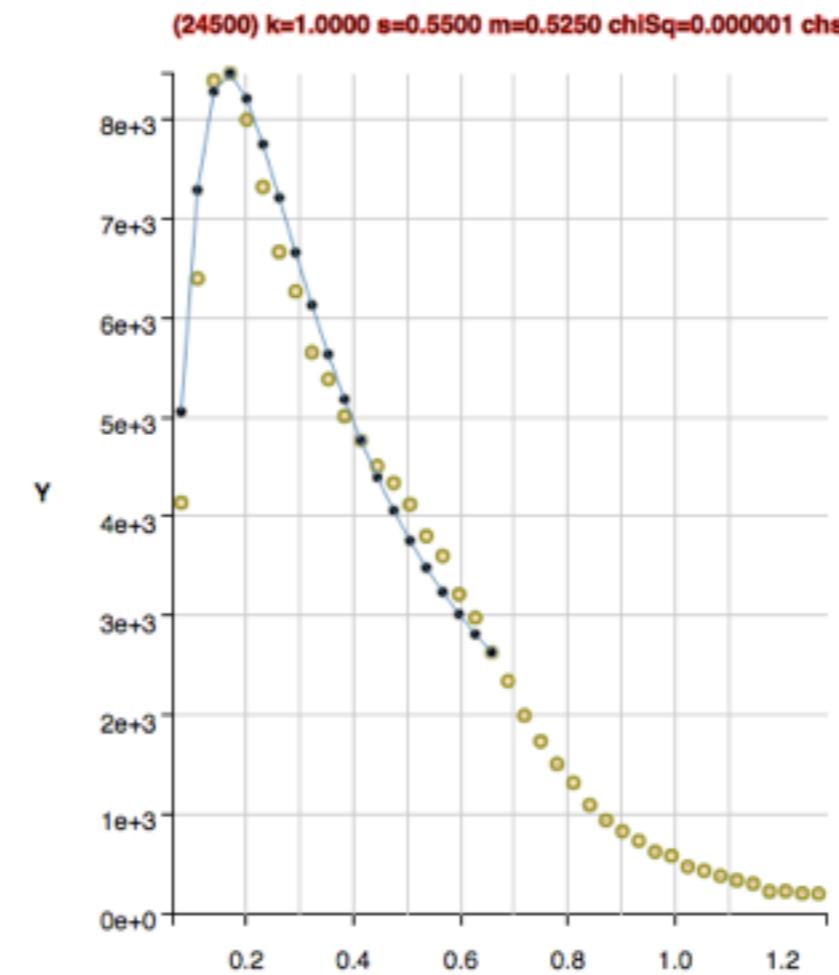
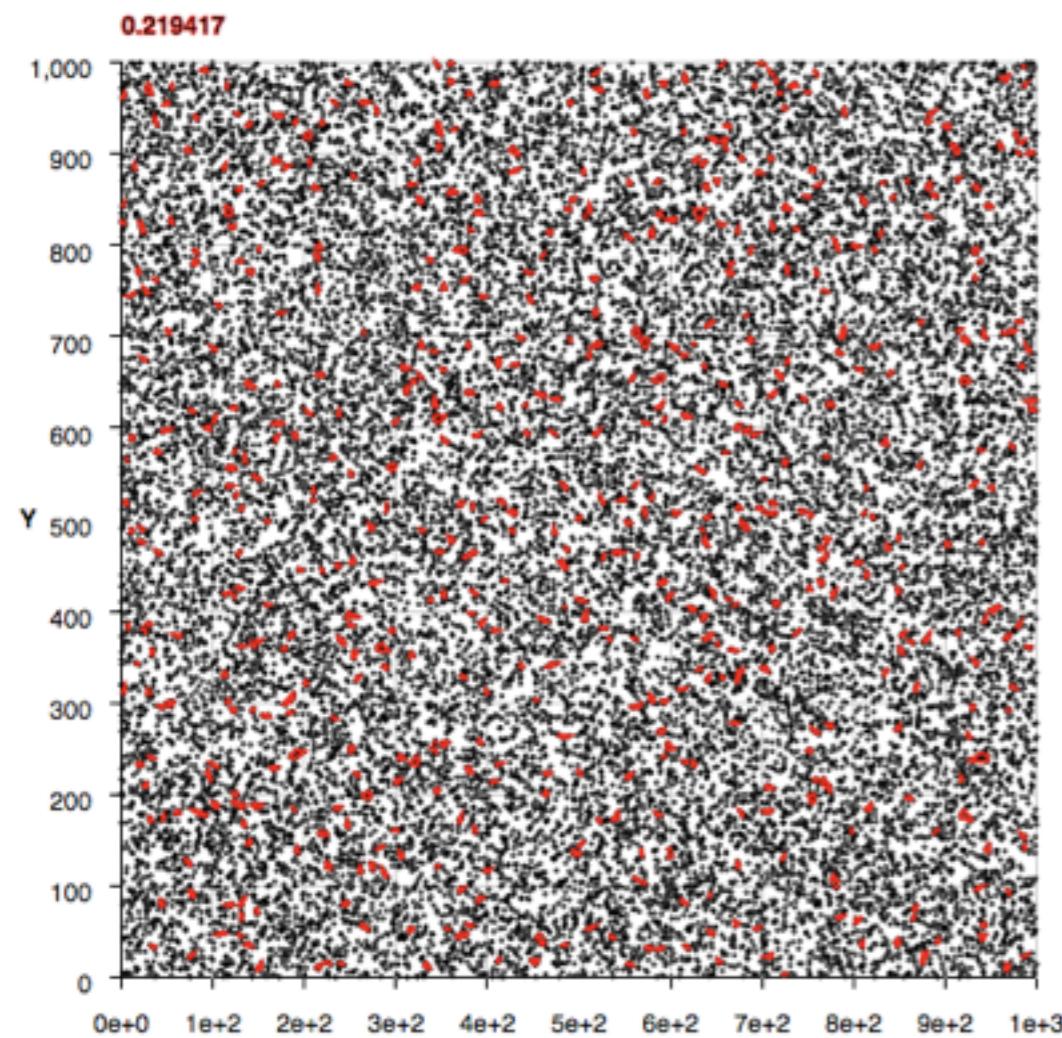
**critical density range**  
**0.22 through inf**

no clusters



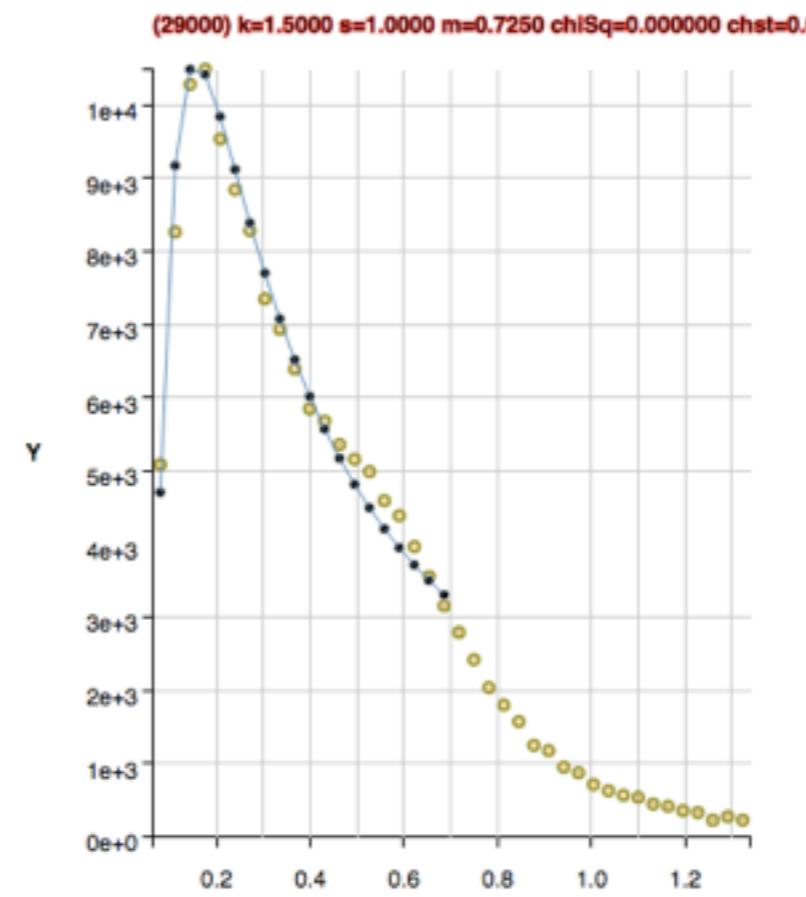
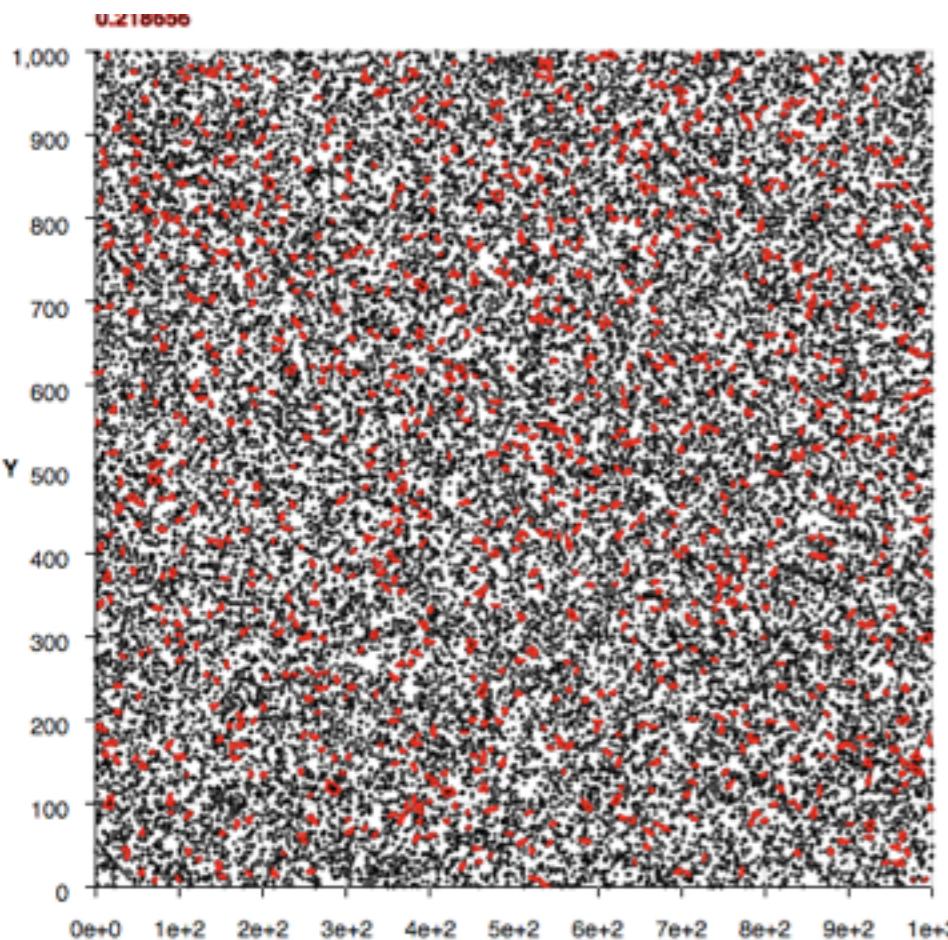
**critical density range**  
**0.22 through inf**

no clusters



**critical density range**  
**0.25 through inf**

no clusters



critical density range  
0.25 through inf

