

VDM groups/clusters reconstruction

A. Iovino - Milano - OAB

O. Cucciati - Milano – Univ. Bicocca

C. Marinoni - Marseille - CPT

S. Bardelli Bologna – OABo

VDM groups/clusters reconstruction

- 1-** Explore the potential of zCOSMOS for groups/clusters searches:
→ biases in groups identification/reconstruction imposed by the survey design
- 2-** The Voronoi-Delauney algorithm for groups reconstruction
- 3-** a possible best parameters choice ...

VDM groups/clusters reconstruction

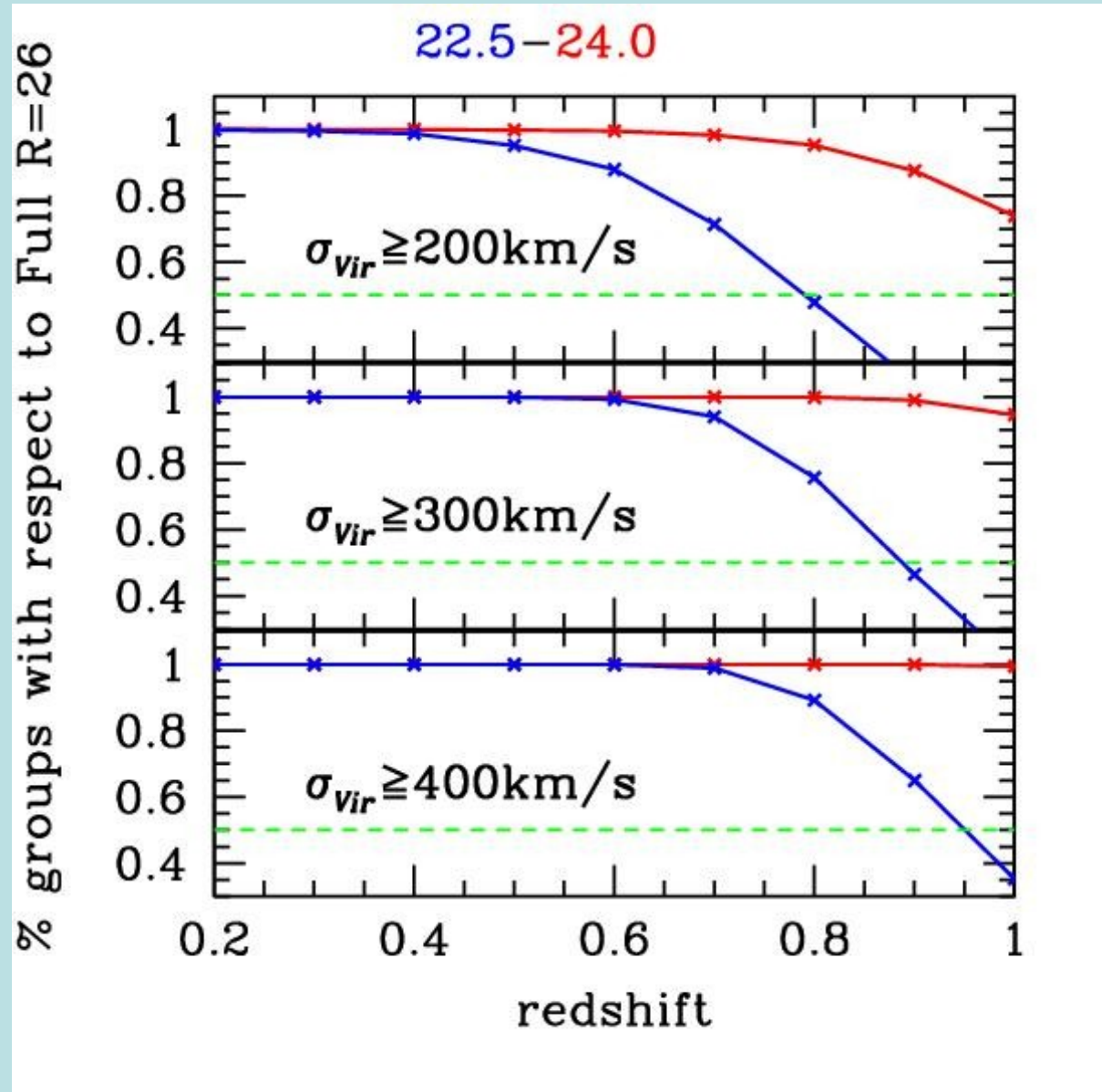
The potential of zCOSMOS for groups/clusters searches:

- $l_{\text{ab}} = 22.5$ spectroscopic limit
- Sampling rate 70%
- Error in z measurement ~ 100 km/sec

Using mock catalogues we can explore how these survey characteristics limit the sample of groups we can detect in an observed catalogue (even with the ideal algorithm).

VDM groups/clusters reconstruction

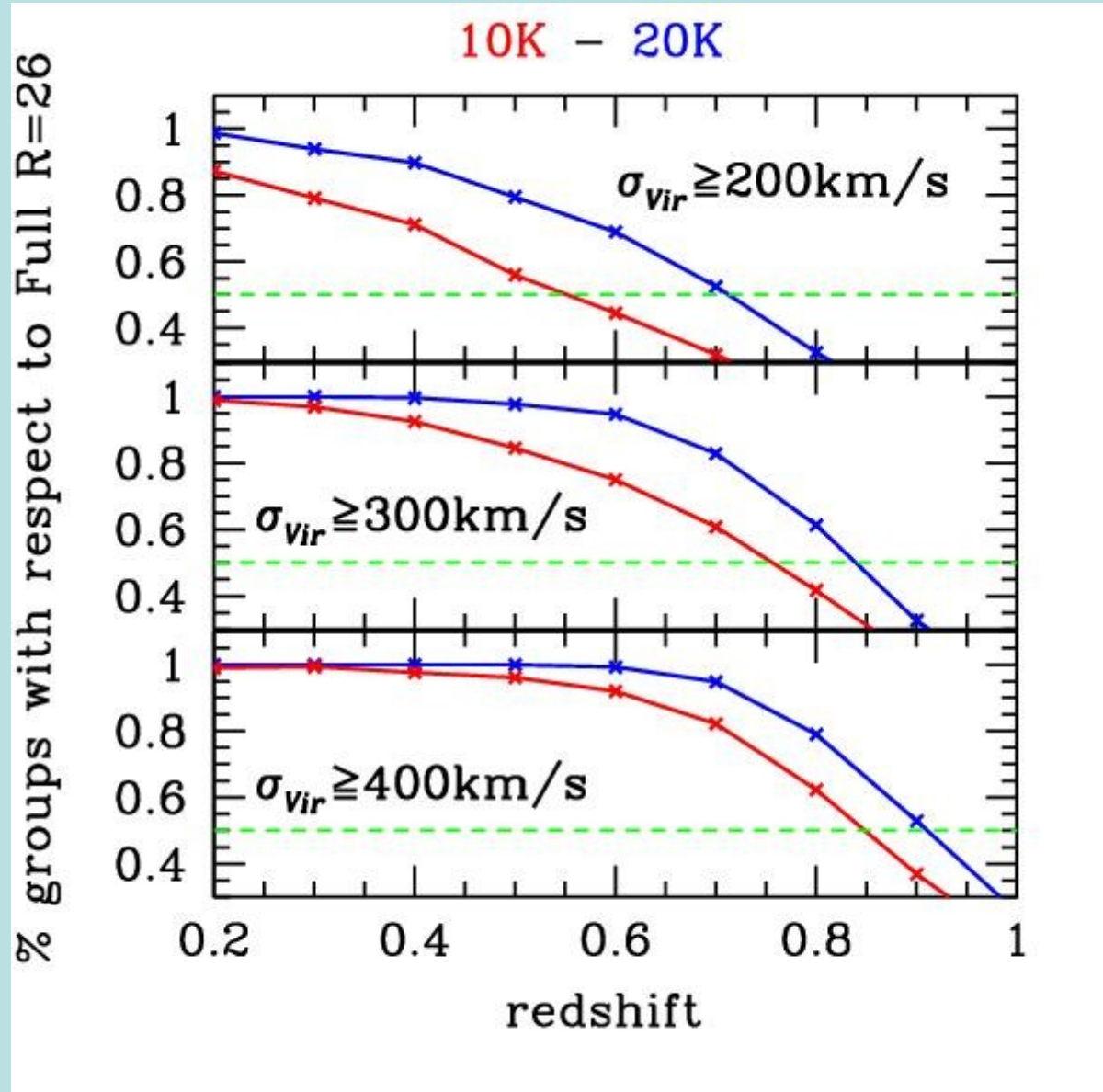
Groups that 'survive' (2 or more members left) as a function of limiting magnitude and σ_{vir} ...



VDM groups/clusters reconstruction

Groups that 'survive' (2 or more members left) as a function of limiting magnitude and σ_{vir} ...

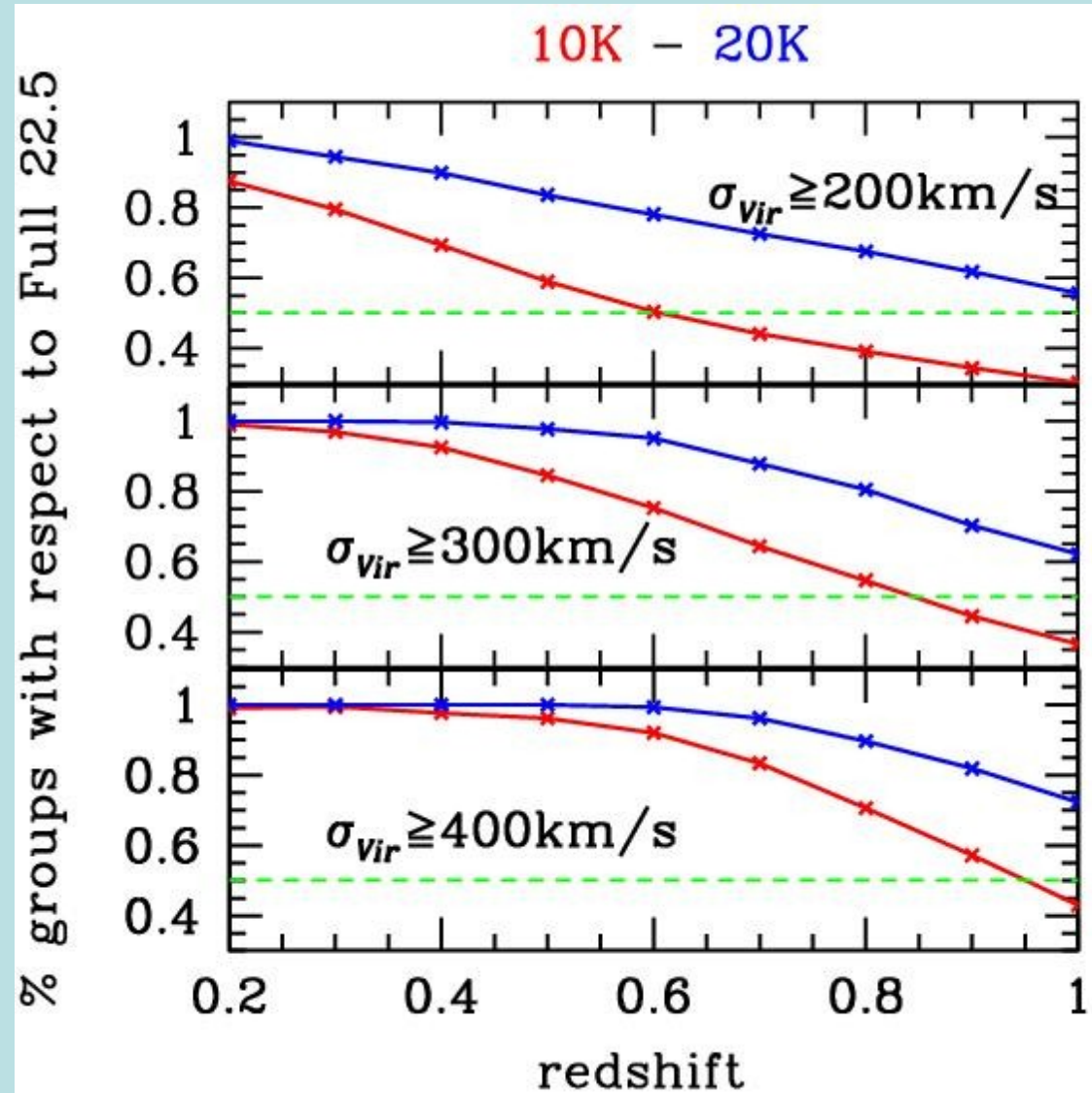
... adding zCosmos survey strategy.



VDM groups/clusters reconstruction

Groups that 'survive' (2 or more members left) as a function of limiting magnitude and σ_{vir} ...

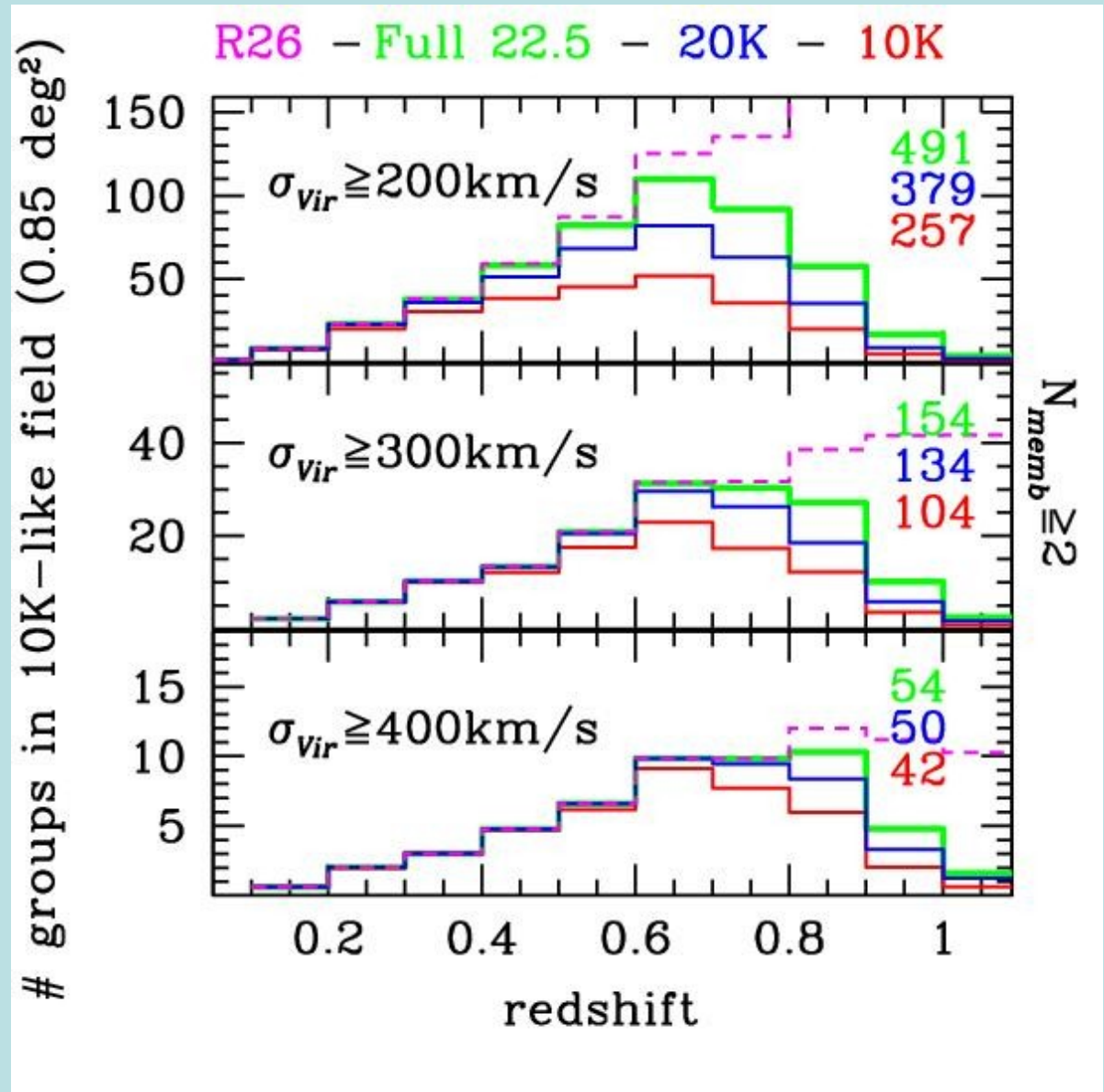
... adding zCosmos survey strategy.



VDM groups/clusters reconstruction

Groups that 'survive' (2 or more members left) as a function of limiting magnitude and σ_{vir} ...

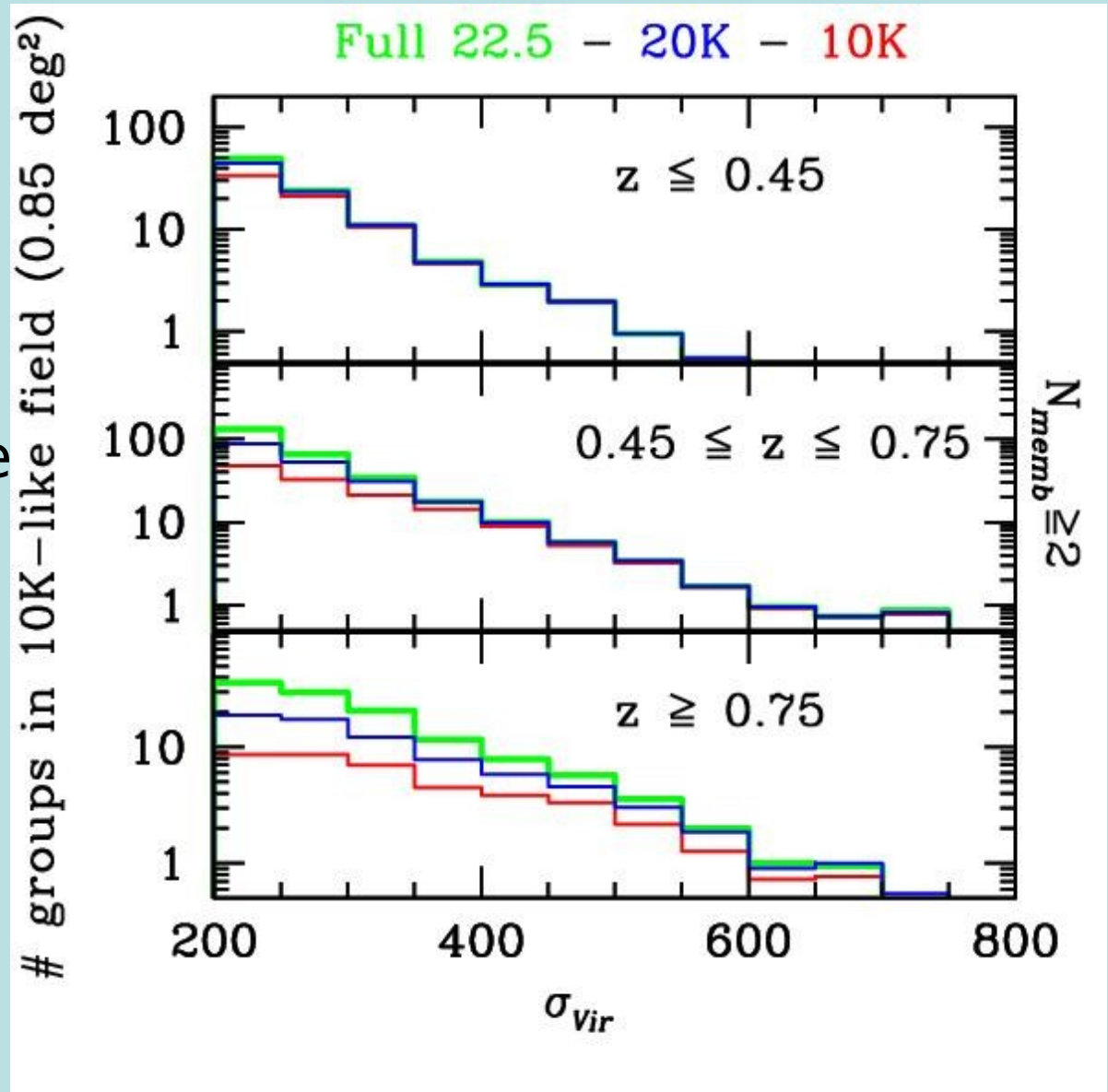
... adding zCosmos survey strategy.



VDM groups/clusters reconstruction

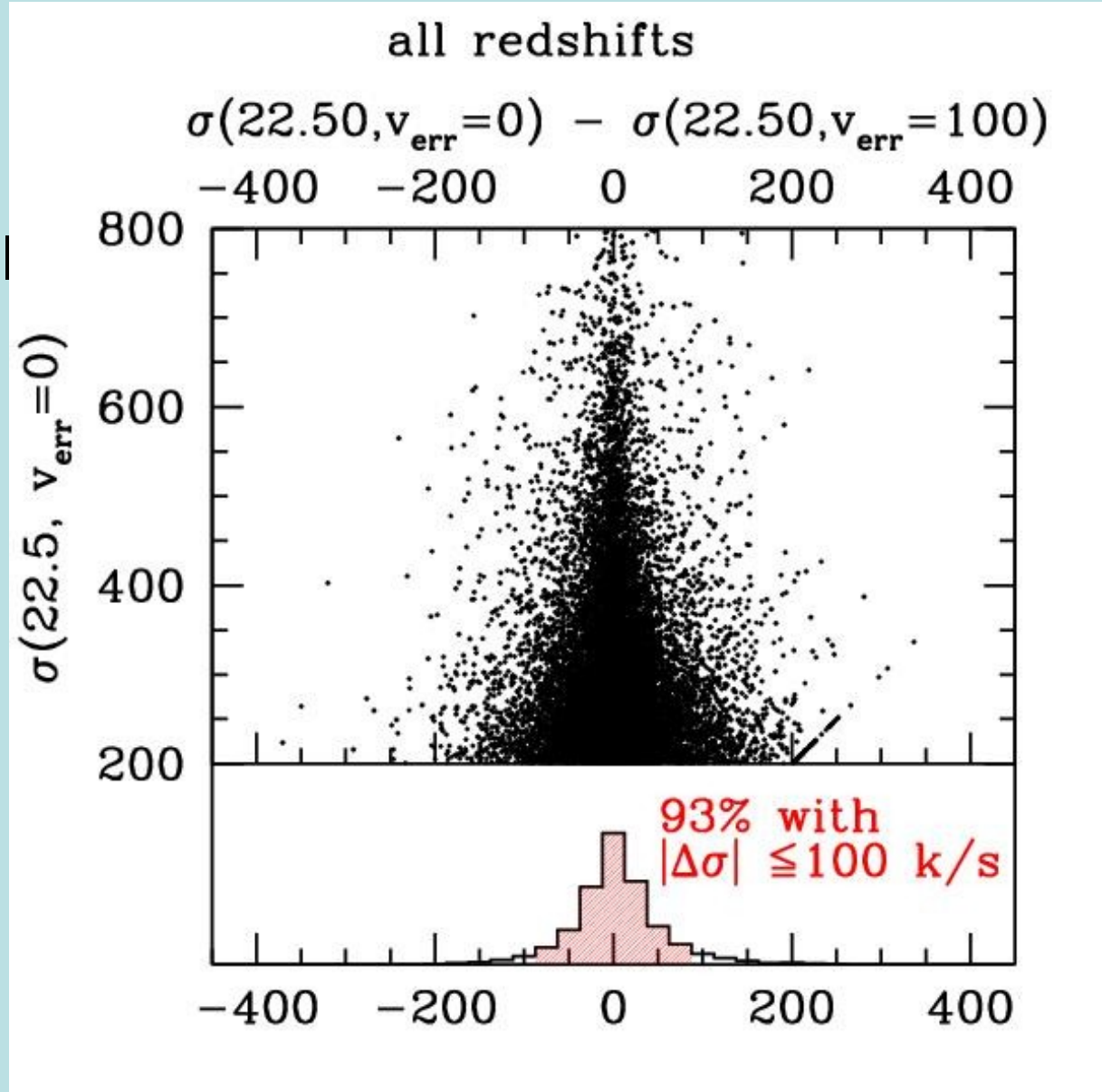
Groups that 'survive' (2 or more members left) as a function of limiting magnitude and σ_{vir} ...

... adding zCosmos survey strategy.



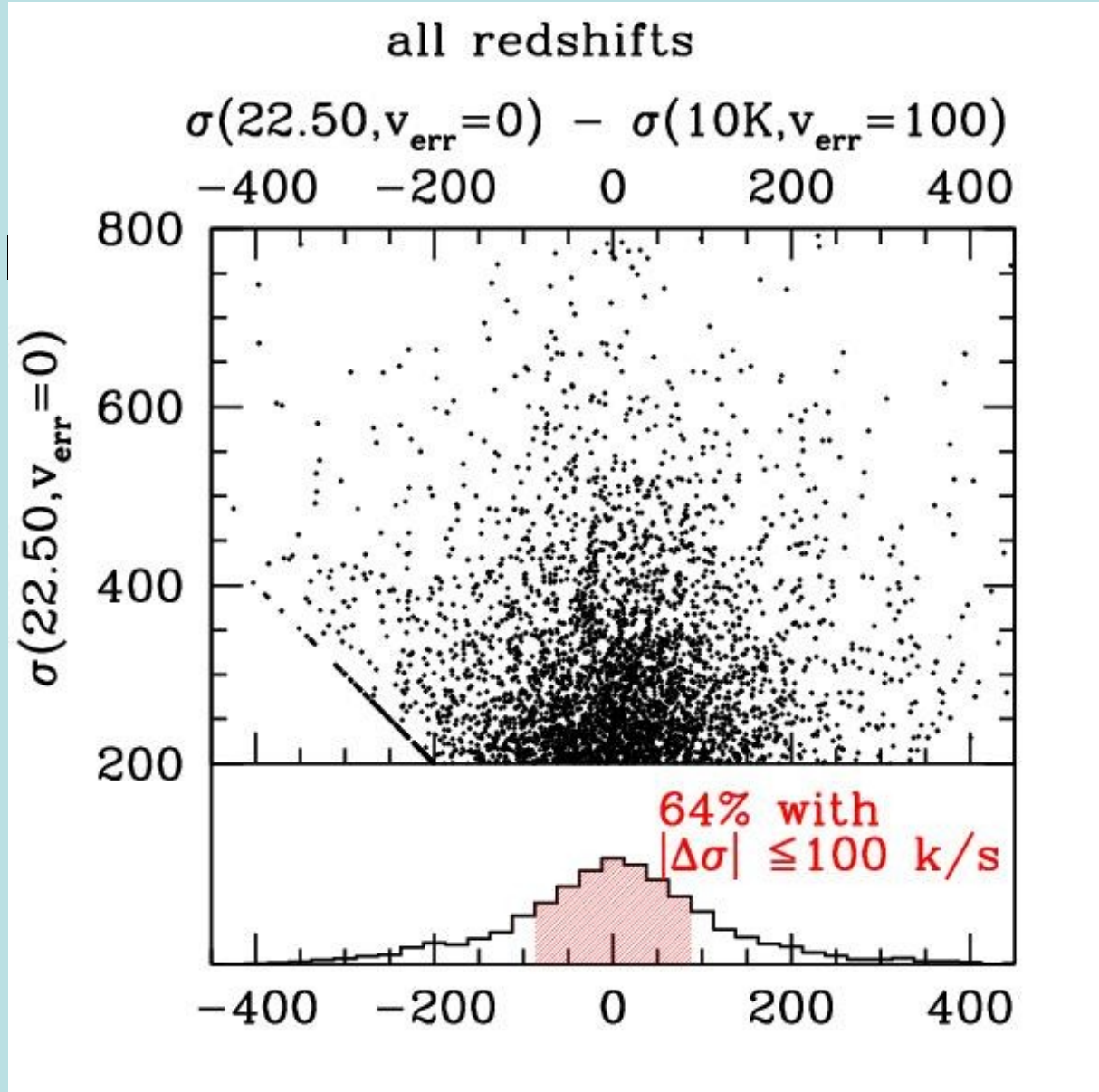
VDM groups/clusters reconstruction

How our observational strategy (mag limit+ sampling rate+Verr) limits our ability in estimating σ_{vir} ?



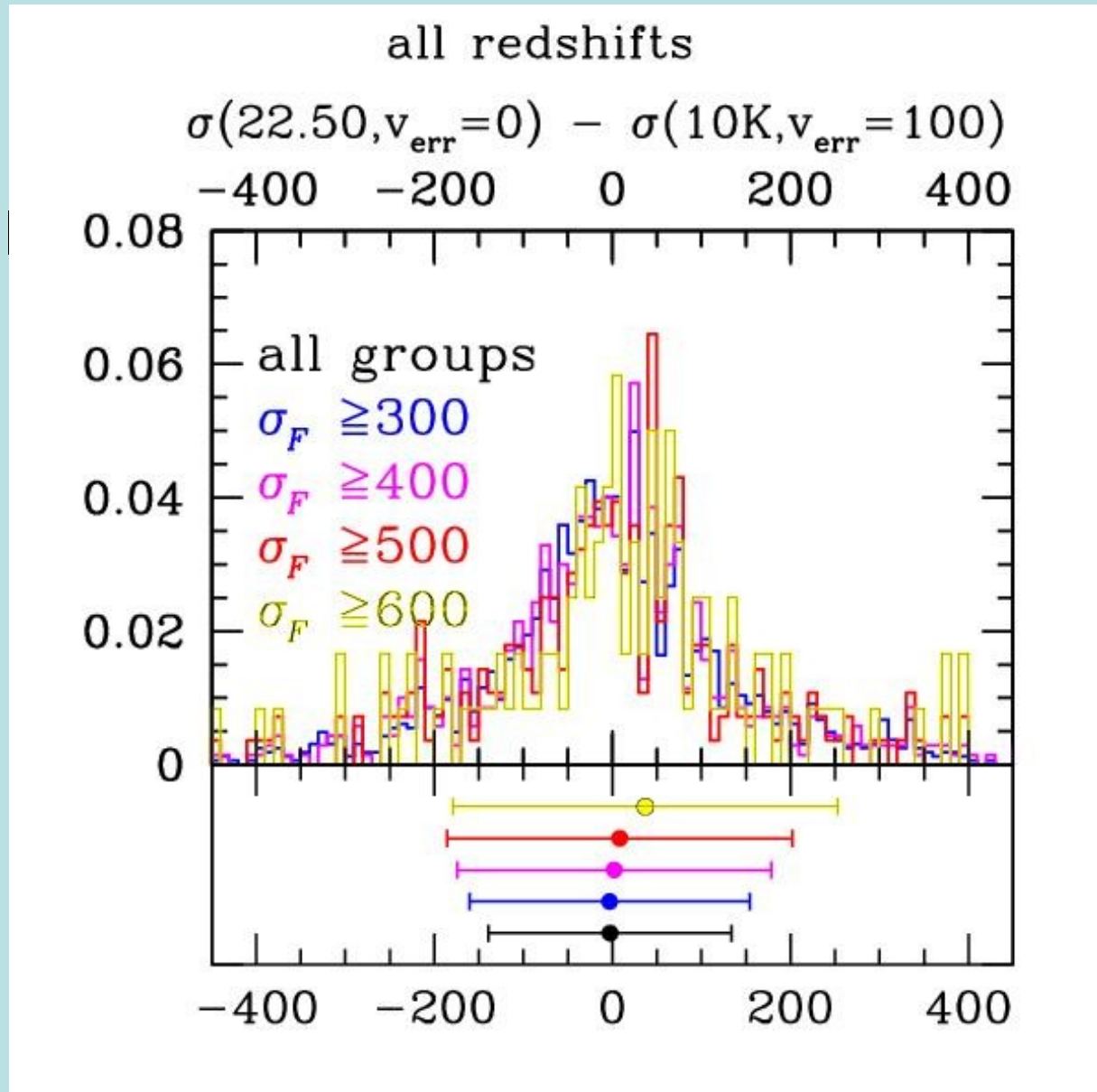
How our observational strategy (mag limit+ sampling rate+Verr) limits our ability in estimating σ_{vir} ?

10 K



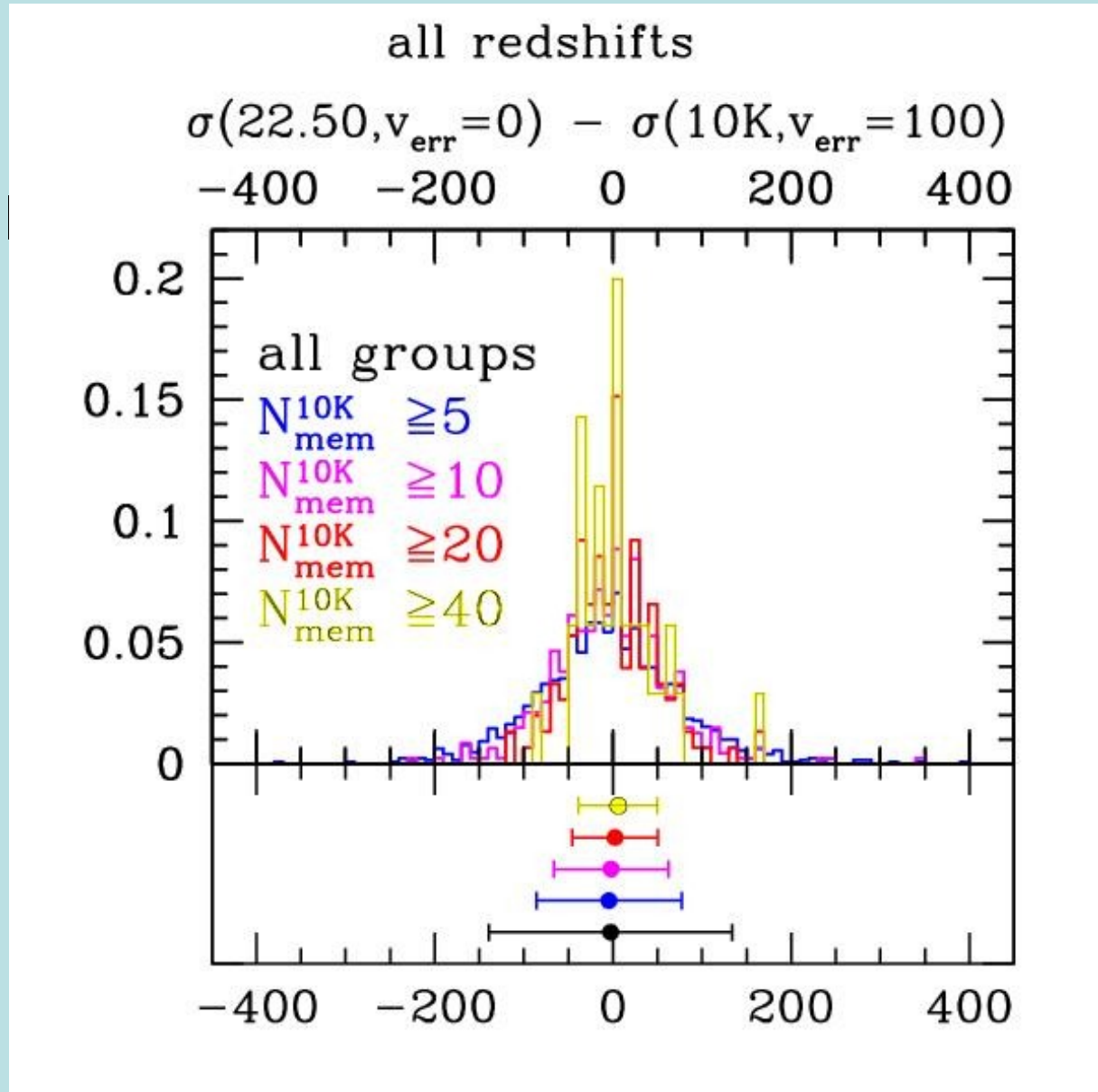
How our observational strategy (mag limit + sampling rate + Verr) limits our ability in estimating σ_{vir} ?

10 K



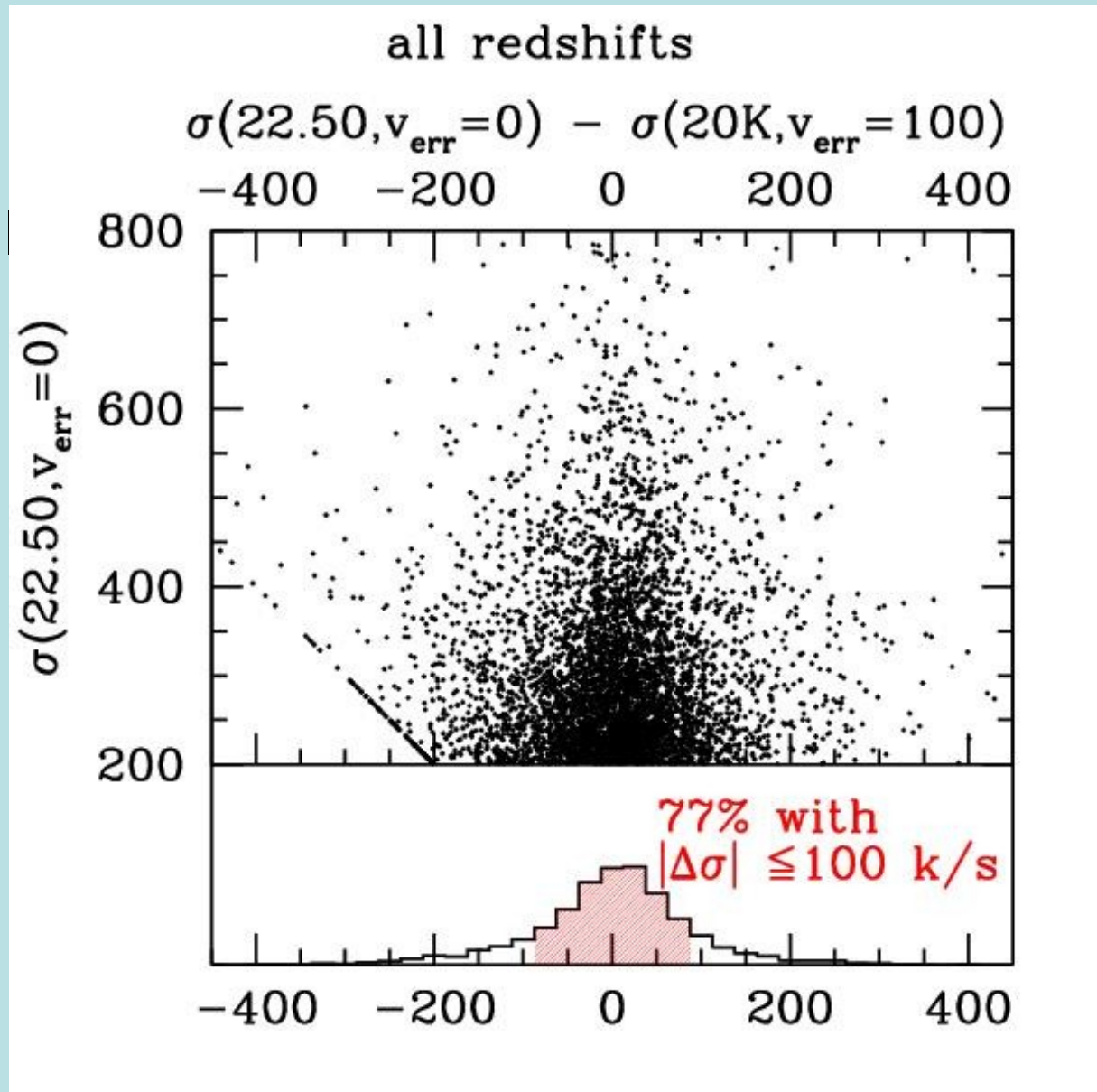
How our observational strategy (mag limit + sampling rate + Verr) limits our ability in estimating σ_{vir} ?

10 K



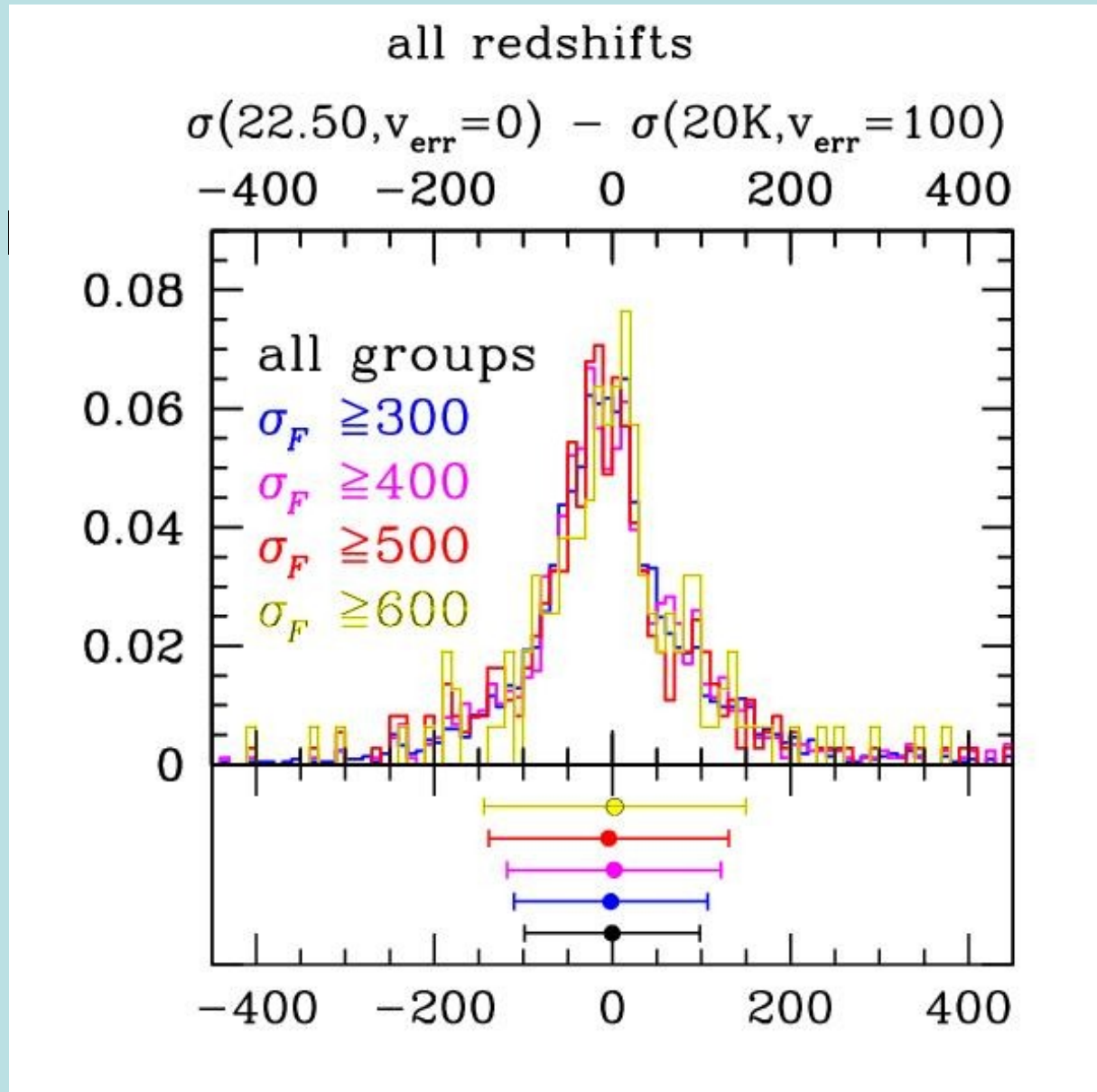
How our observational strategy (mag limit+ sampling rate+Verr) limits our ability in estimating σ_{vir} ?

20 K



How our observational strategy (mag limit + sampling rate + Verr) limits our ability in estimating σ_{vir} ?

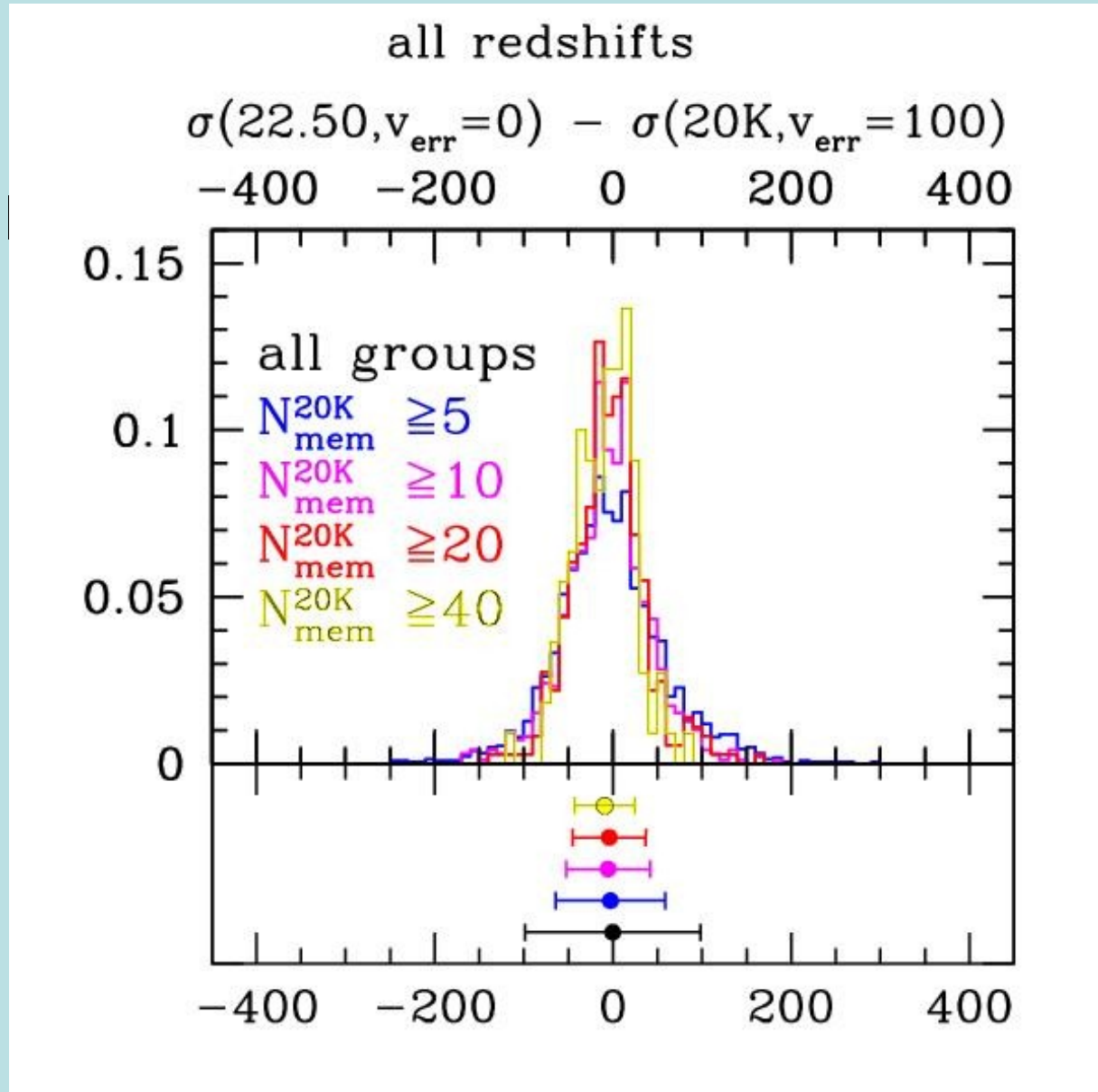
20 K



VDM groups/clusters reconstruction

How our observational strategy (mag limit+ sampling rate+Verr) limits our ability in estimating σ_{vir} ?

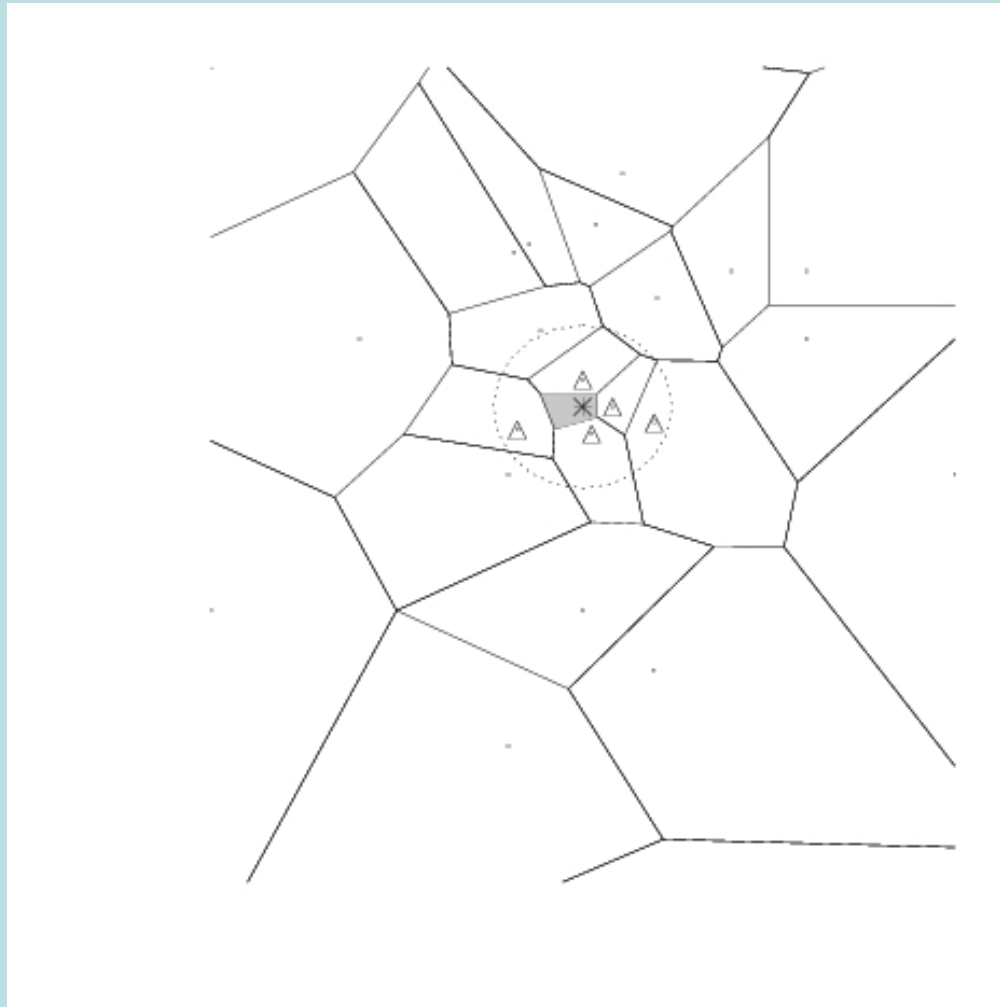
20 K



The Voronoi-Delauney algorithm for groups reconstruction
(Marinoni et al. 2002)

1- Galaxy group centers are identified by peaks
in the galaxy density field.

VDM groups/clusters reconstruction



Voronoi-Delaunay mesh

First Step

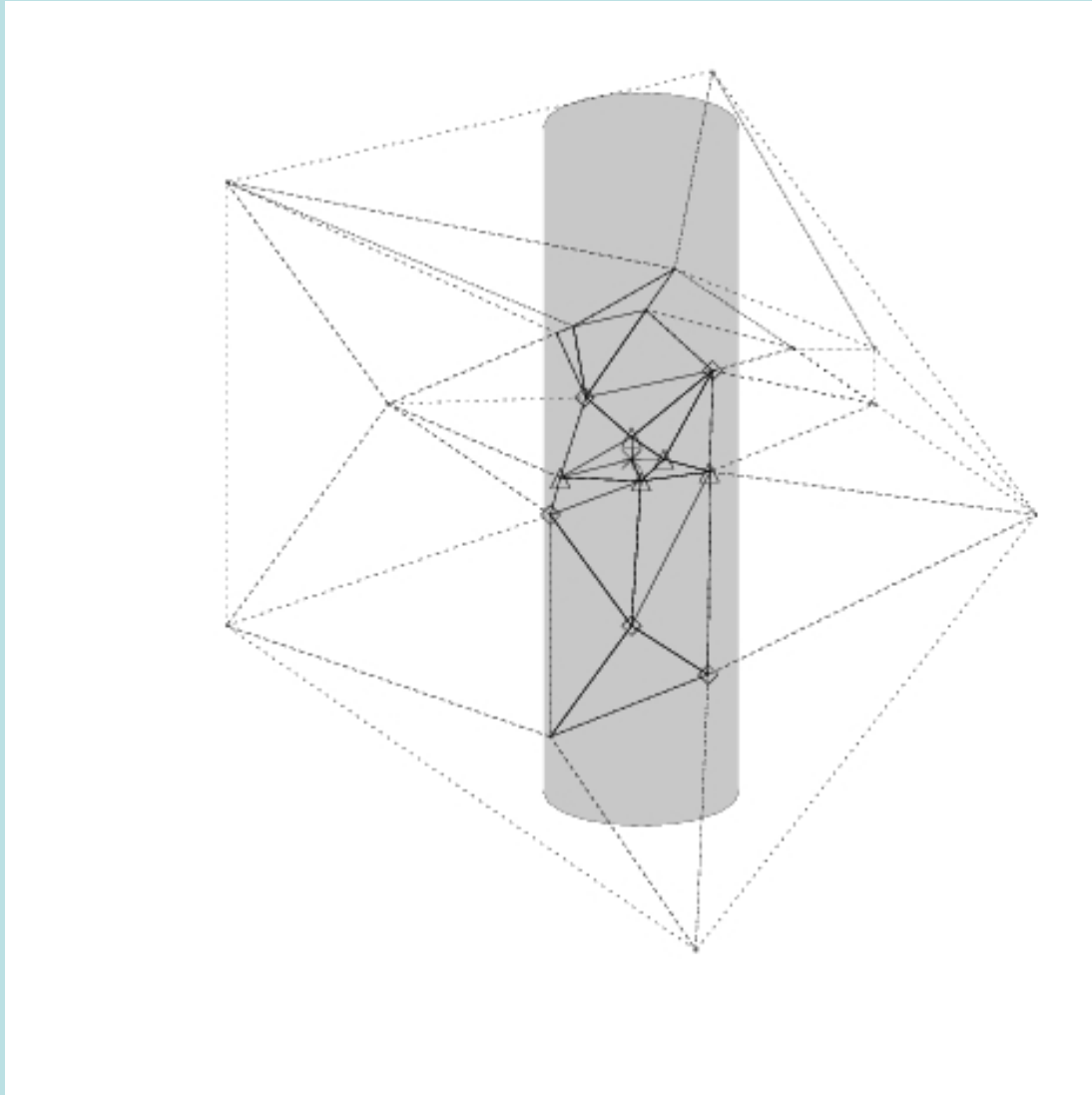
3-D identification
of groups seeds

~ volume occupied
by each galaxy

The Voronoi-Delauney algorithm for groups reconstruction (Marinoni et al. 2002)

1- Galaxy group centers are identified by peaks in the galaxy density field.

2-All galaxies located within a cylindrical volume in redshift space centered on that concentration are assigned to the group.



Second Step

Adaptive scaling that takes into account central richness, exploiting the richness-vel disp correlation

VD (Voronoi-Delauney) method depends uniquely on the **geometry** of the distribution of galaxies + parameters depending on the **simple physical definition** of a group/cluster.

No a-priori length scale defined (as for FoF)

No need to use LF of galaxies

More physical considerations: the two parameters that define the search (R and L) have a simple meaningful interpretation (core-radius + vel disp)

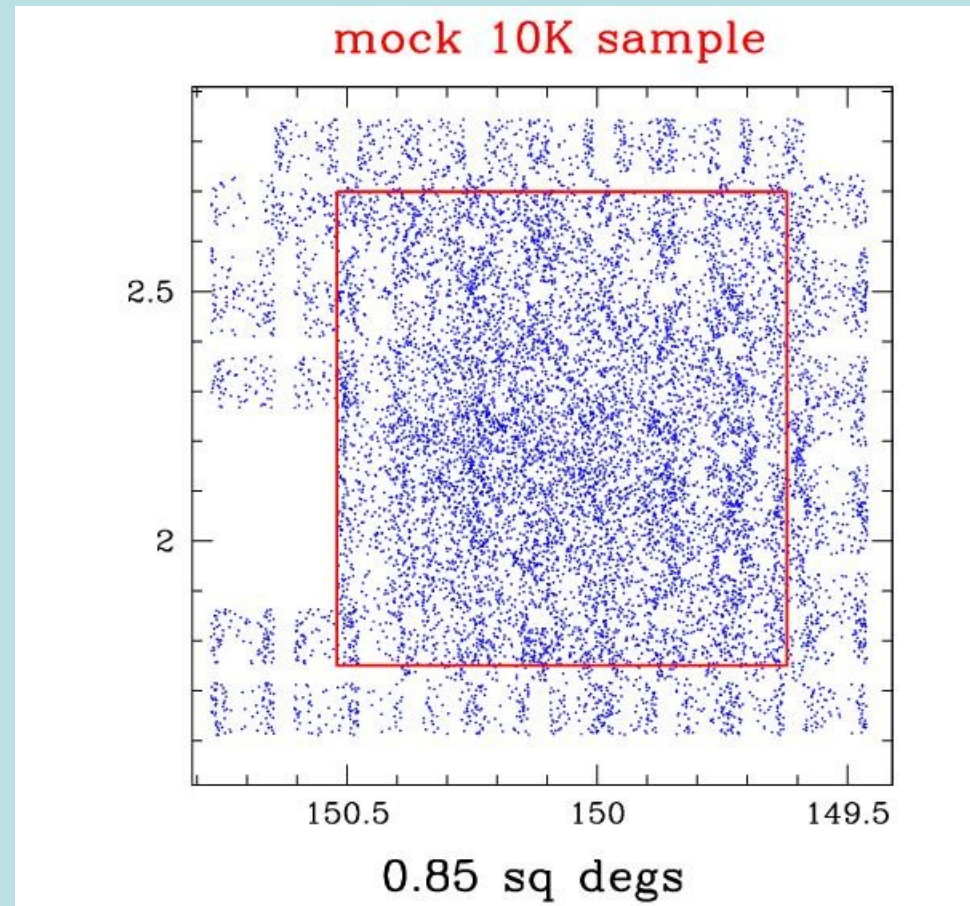
Bottom line:

- 1** is really fast
- 2** more physical considerations, less ad hoc choices
- 3** should be relatively easy to describe the cluster sample **completeness and selection function** in terms of **cluster velocity dispersion** (i.e. what we want to compare with theoretical models of structure formation).

We have started extensive tests using the Millennium Simulations cones ...

We have produced mocks that reproduce the selection biases of the true z-Cosmos sample ...

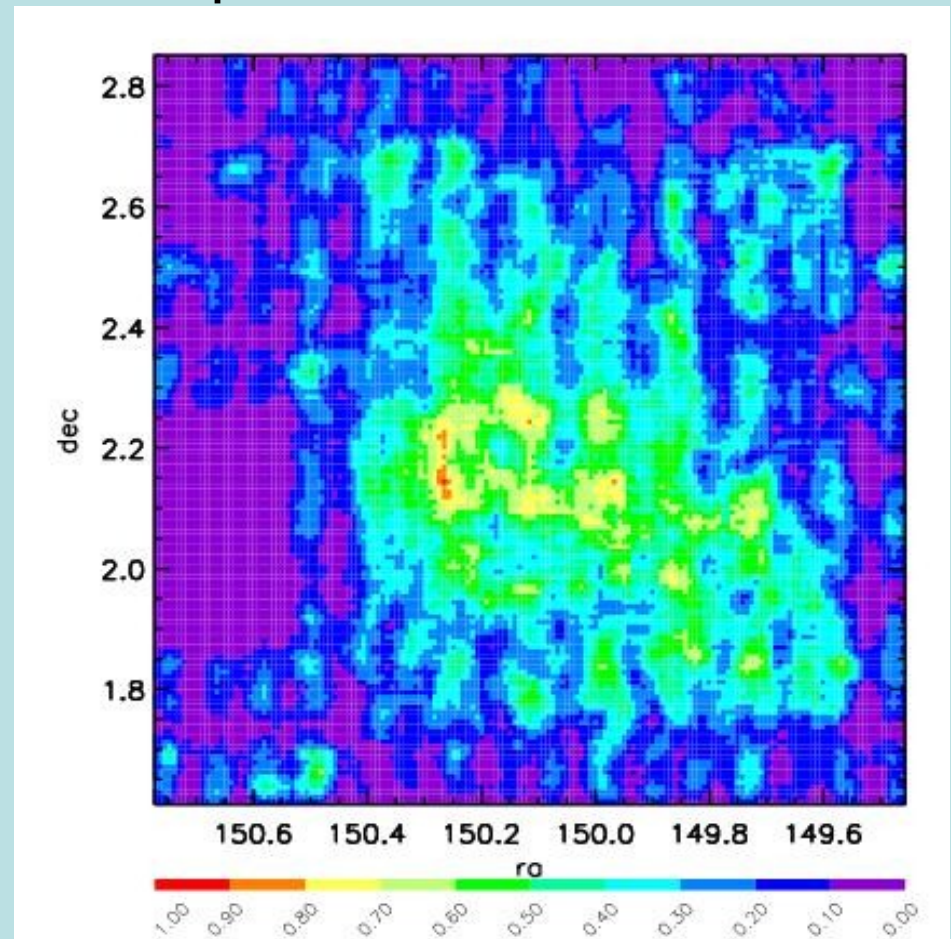
- Spoc (and its mag dependence in slit positioning efficiency)
- success rate in redshift measurements



We have started extensive tests using the Millennium Simulations cones ...

We have produced mocks that reproduce the selection biases of the true z-Cosmos sample ...

- Spoc (and its mag dependence in slit positioning efficiency)
- success rate in redshift measurements

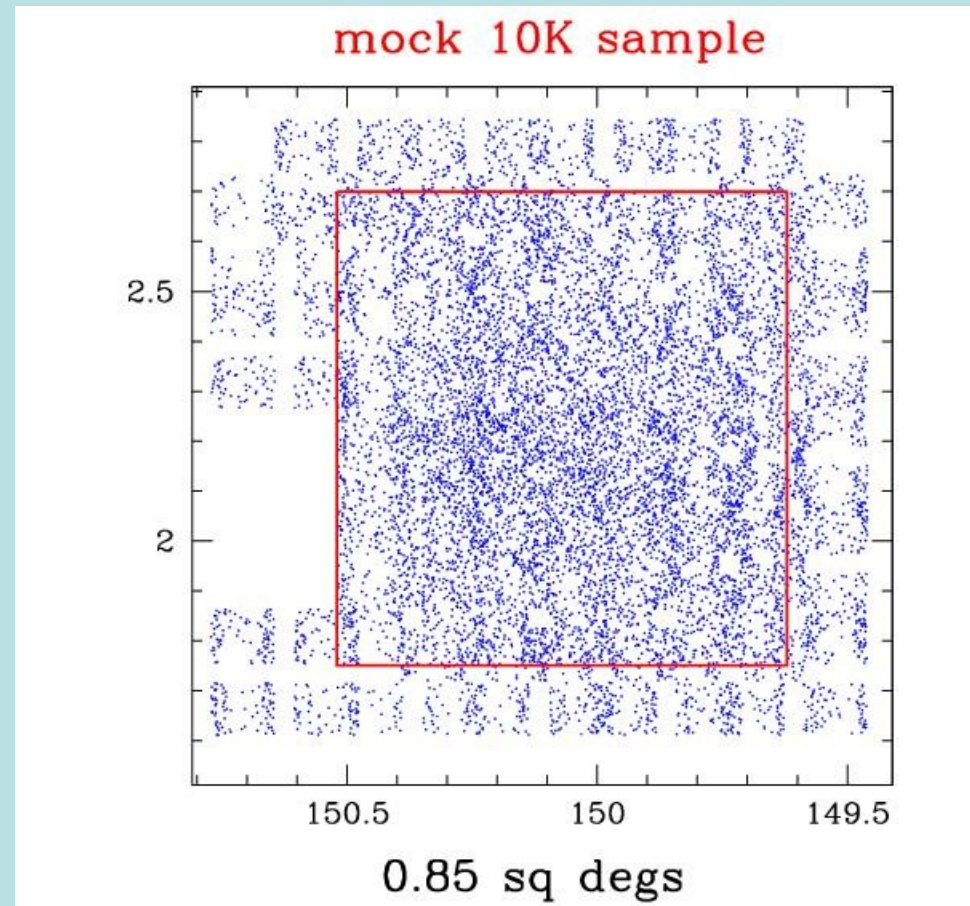


VDM groups/clusters reconstruction

We have started extensive tests using the Millennium Simulations cones ...

We have produced mocks that reproduce the selection biases of the true z-Cosmos sample ...

We have run a full battery of VDM parameters and searched for the best possible completeness and purity of the resulting galaxy catalogue ...



Our results from simulations:

Purity = 0.58 (0.54 2-ways)

Completeness = 0.73 (0.50 2-ways)

Interlopers fraction = 0.38

Galaxies successfully recovered = 0.68

Completeness improve removing
pairs from catalogue:

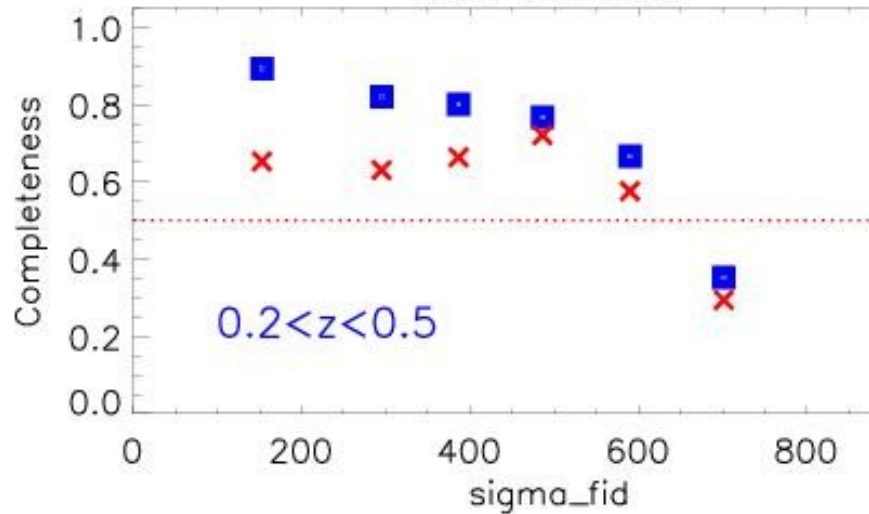
Completeness no pairs = 0.81 (0.64 two
ways)

while purity does not change much ...

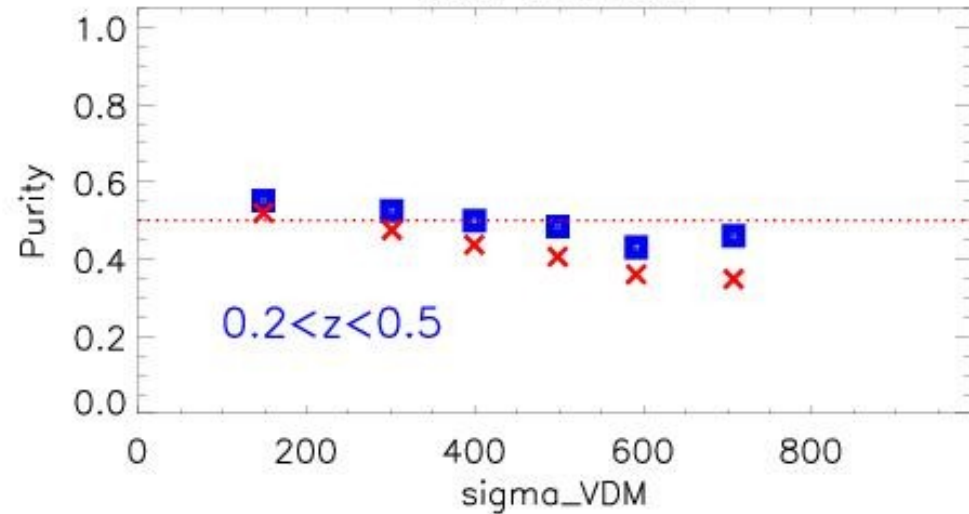
... we hope to improve further !!

VDM groups/clusters reconstruction

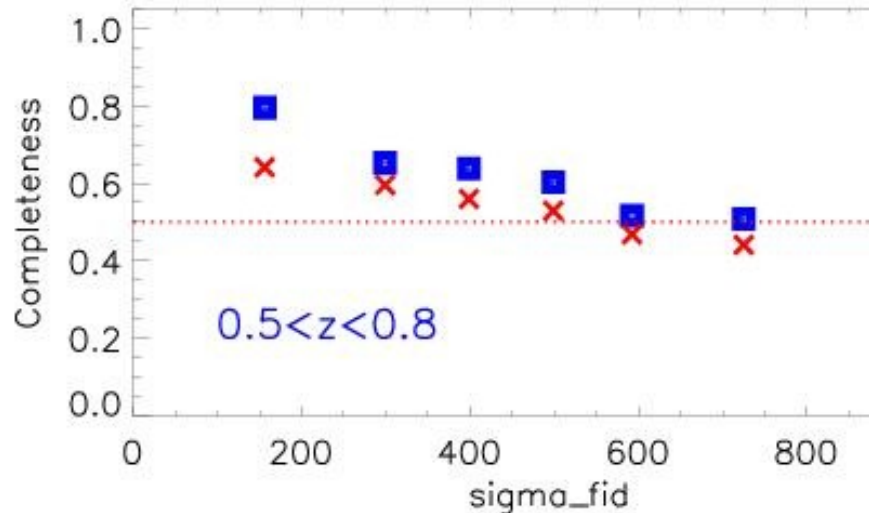
ONLY TRIPLETS



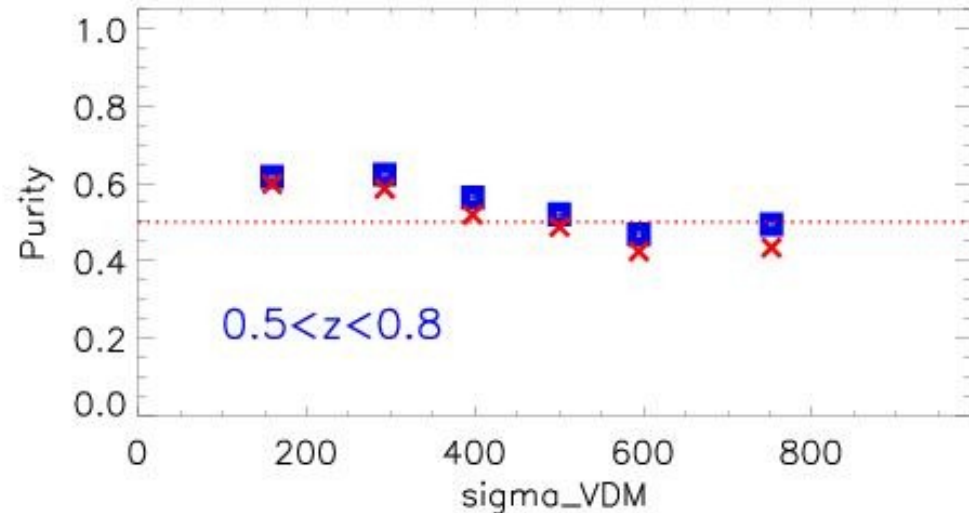
ONLY TRIPLETS



ONLY TRIPLETS



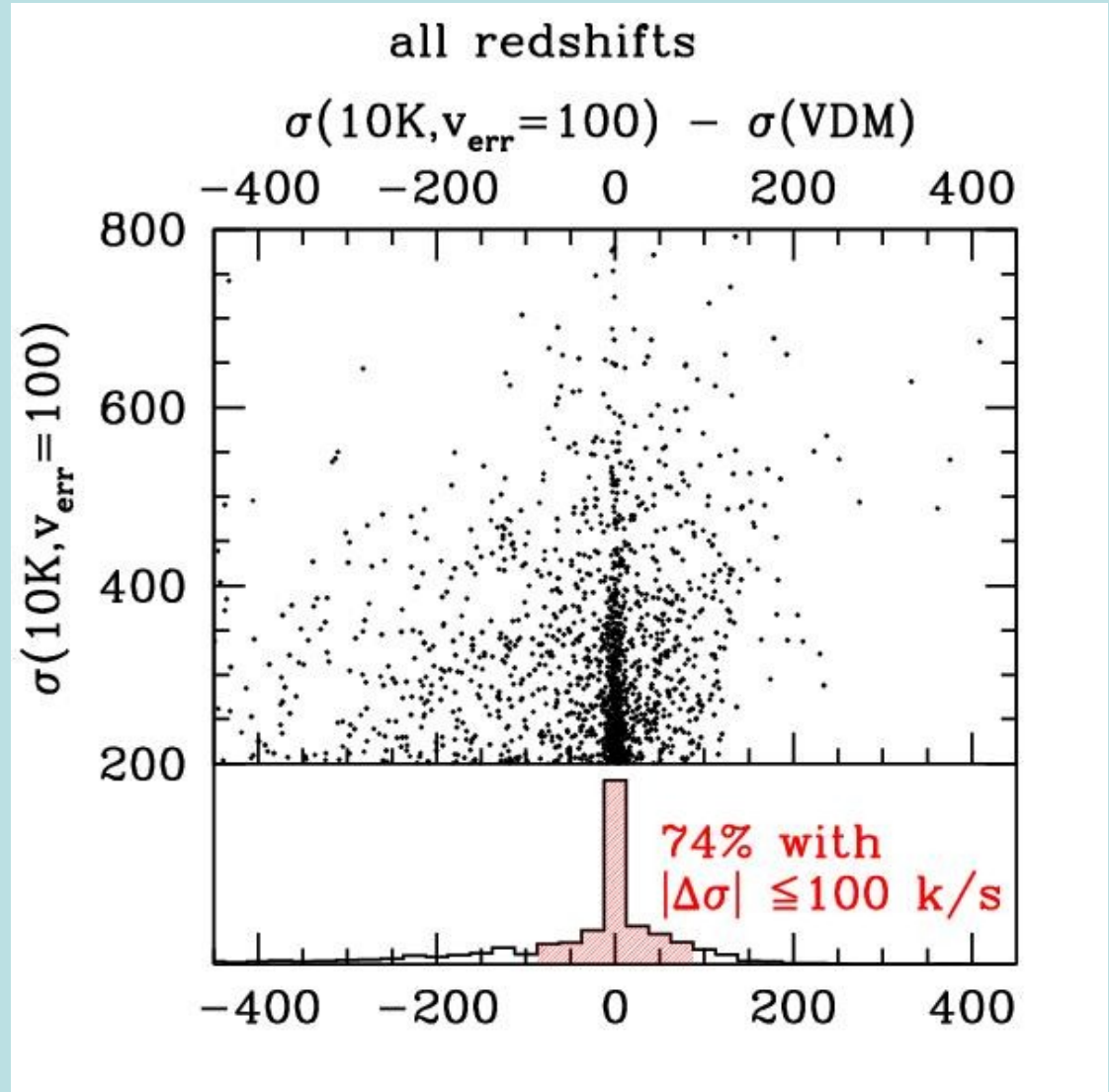
ONLY TRIPLETS



completeness

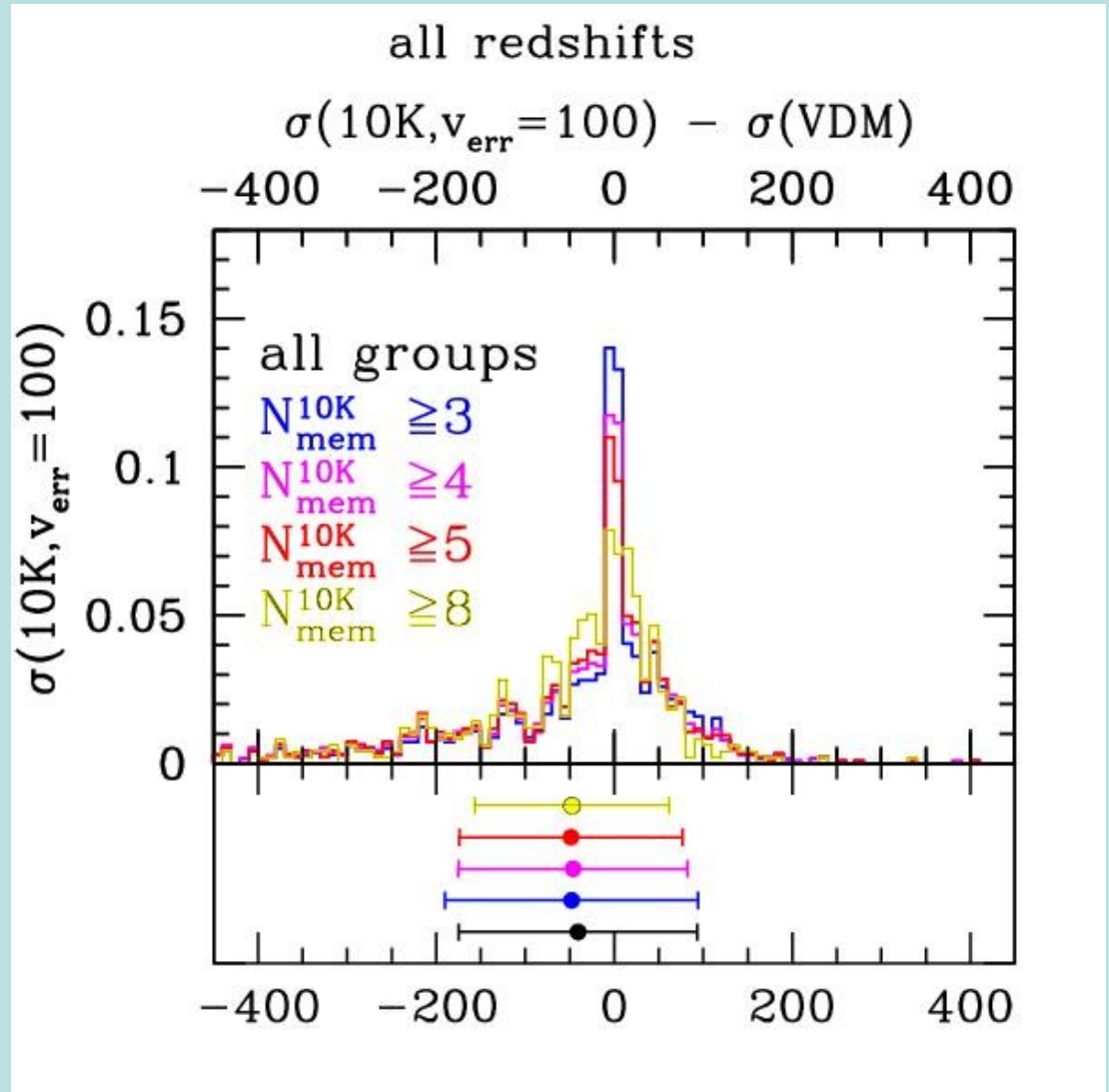
purity

Goodness of σ measurement in VDM groups ...

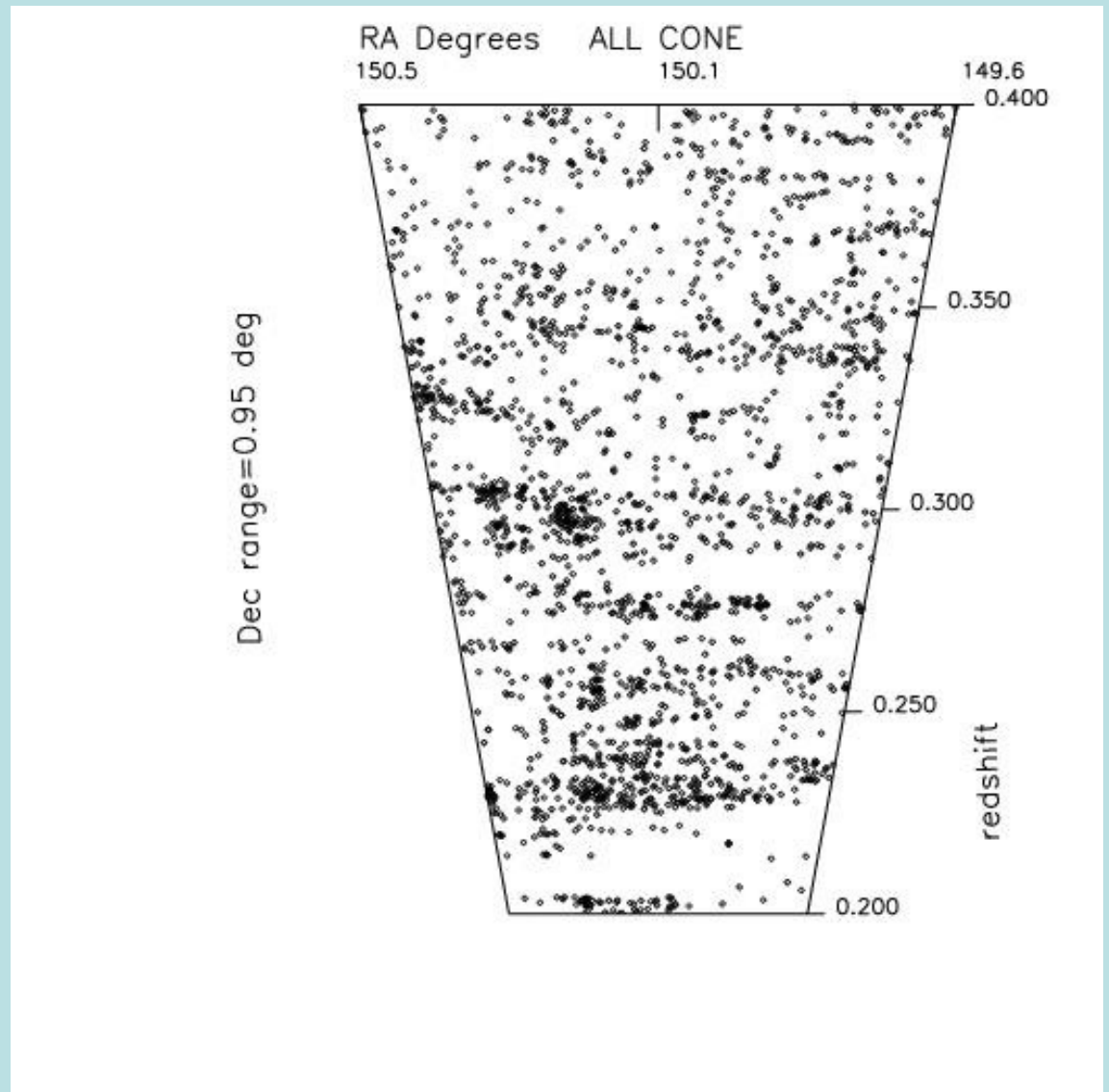


VDM groups/clusters reconstruction

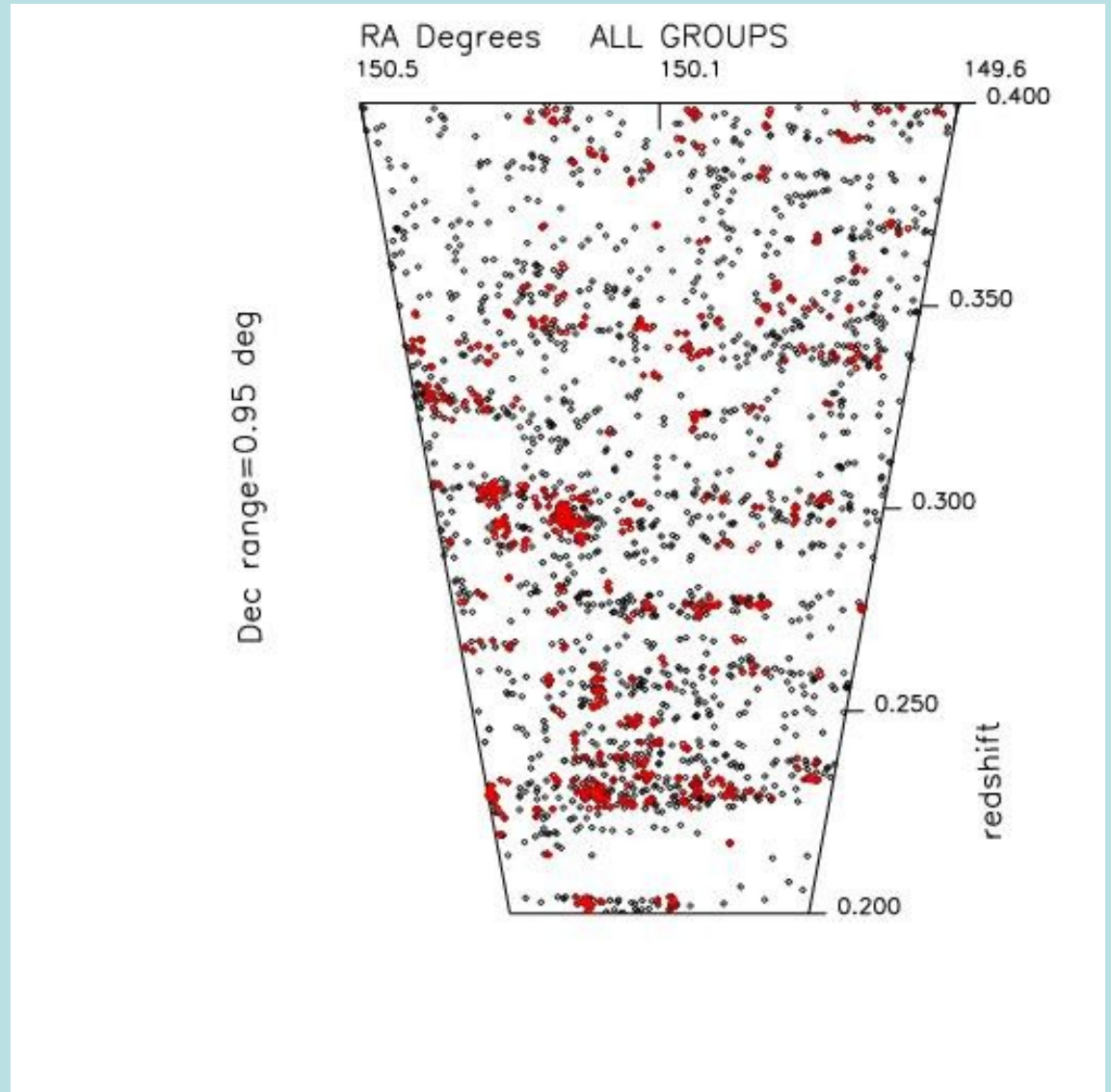
Goodness of σ measurement in VDM groups ...



An example mock cone ...

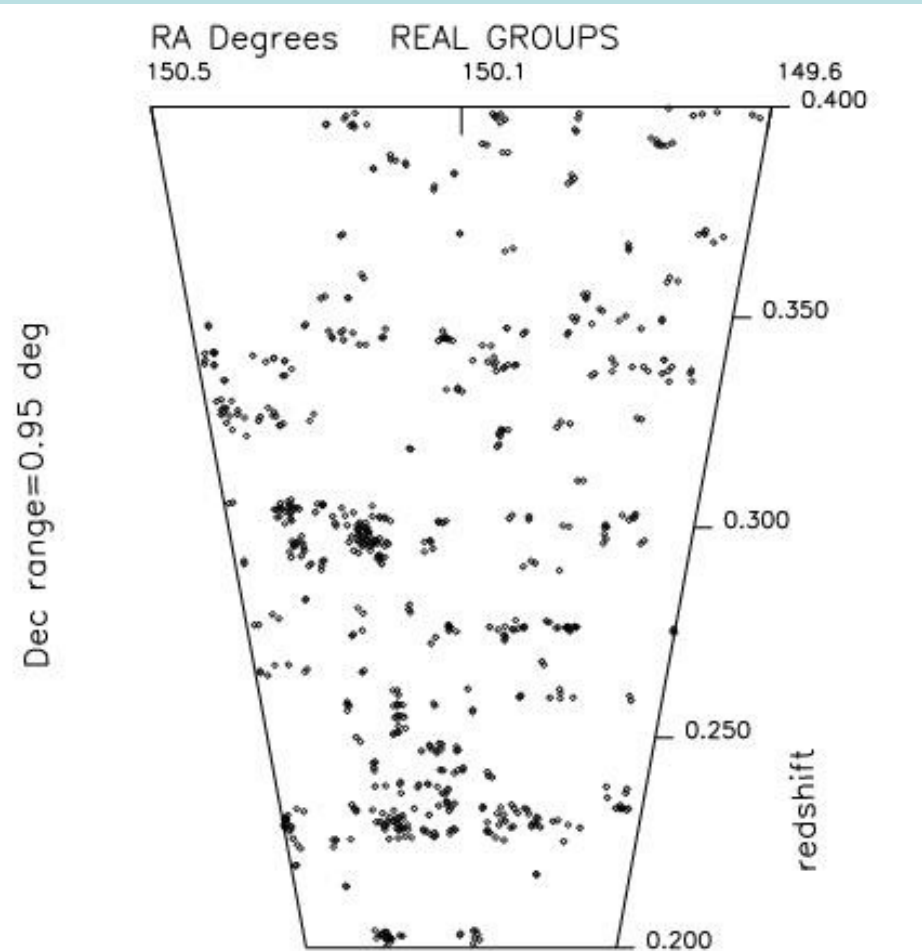


An example mock
cone ...



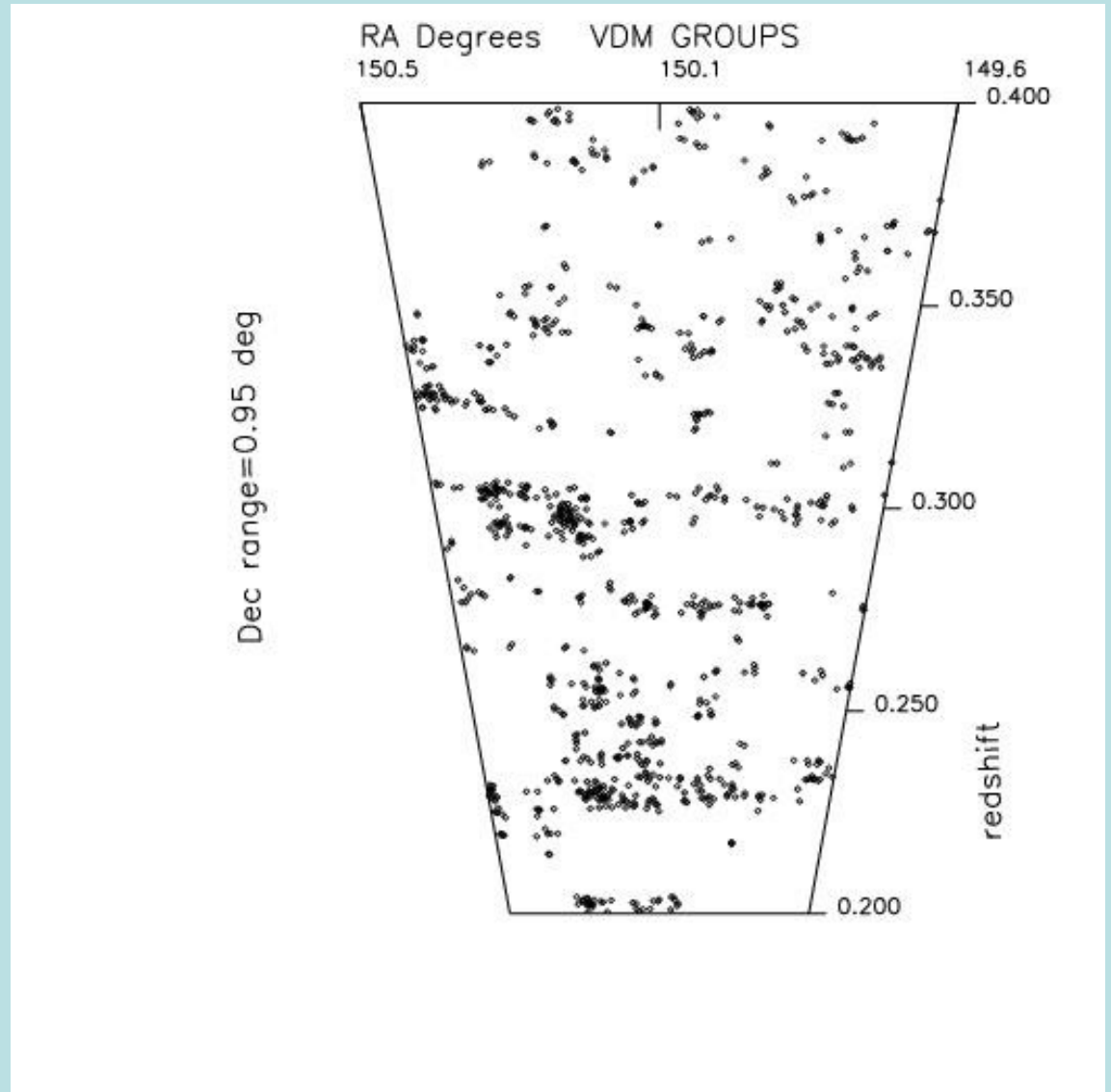
VDM groups/clusters reconstruction

An example mock
cone ...



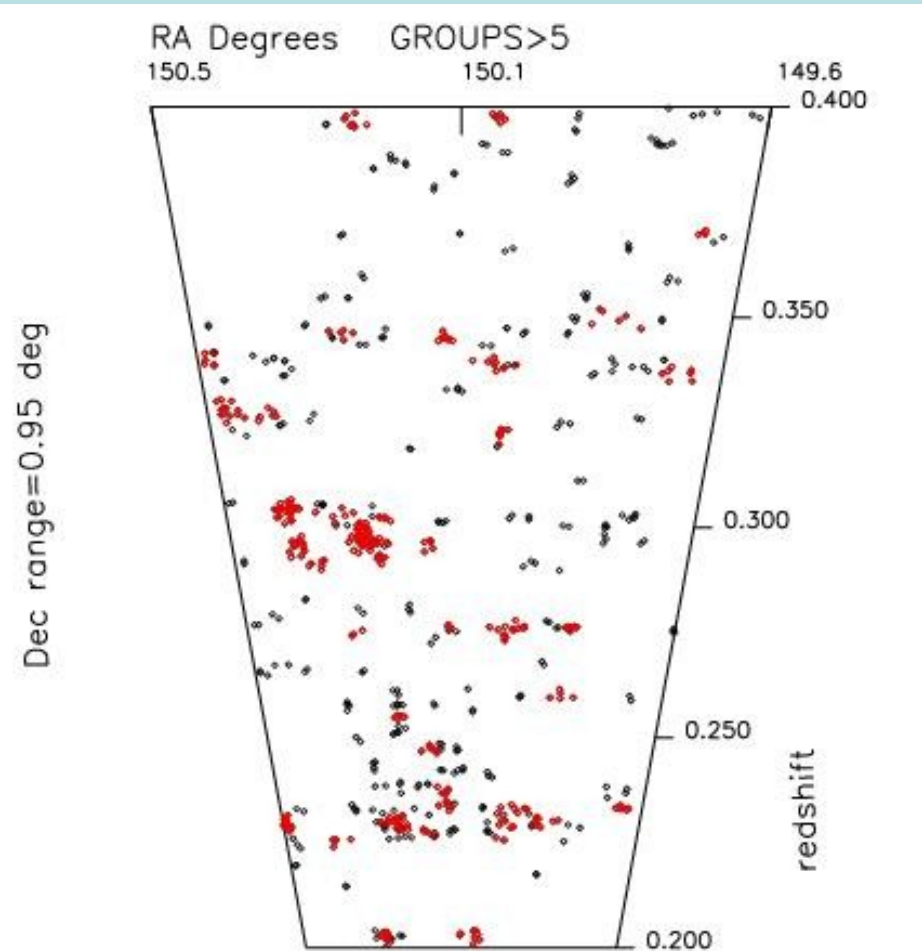
VDM groups/clusters reconstruction

An example mock
cone ...



VDM groups/clusters reconstruction

An example mock
cone ...



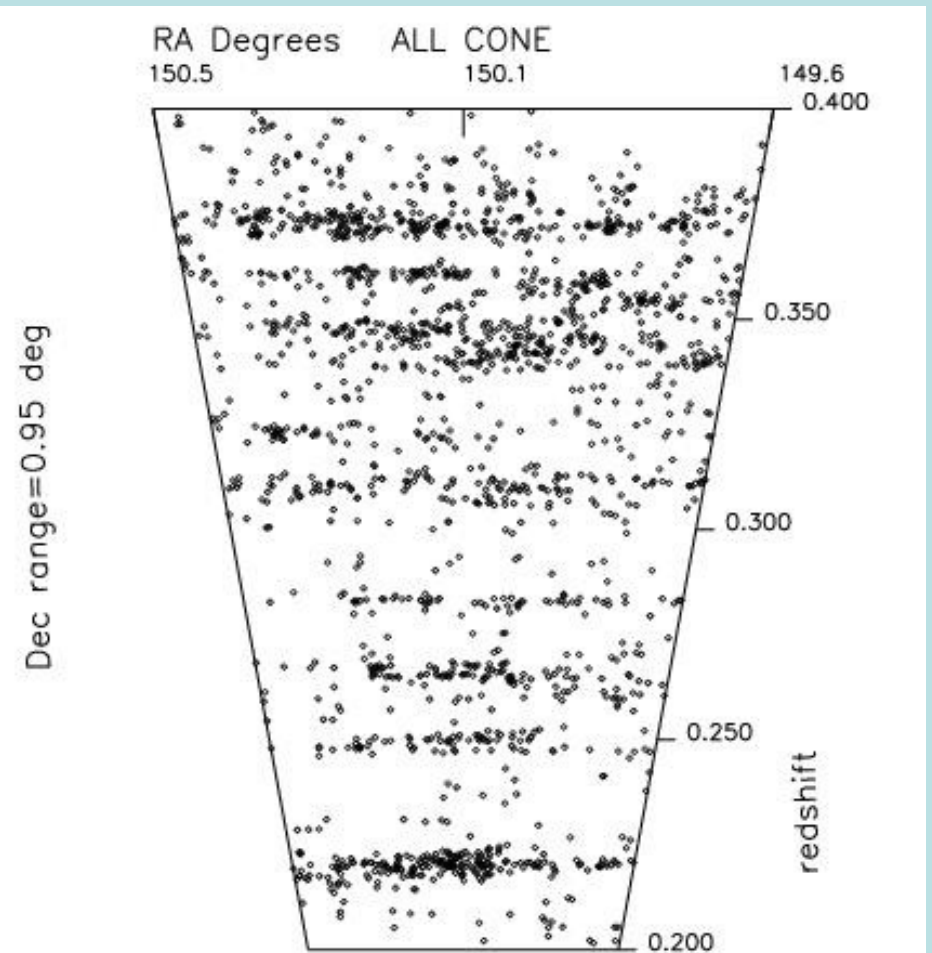
Now *our*
cone ...

Numbers:

ss	s	ls	
3	486	572	All
182	193	209	pairs
5	117	143	triplets
56	61	72	quartets
68	70	90	5 or more

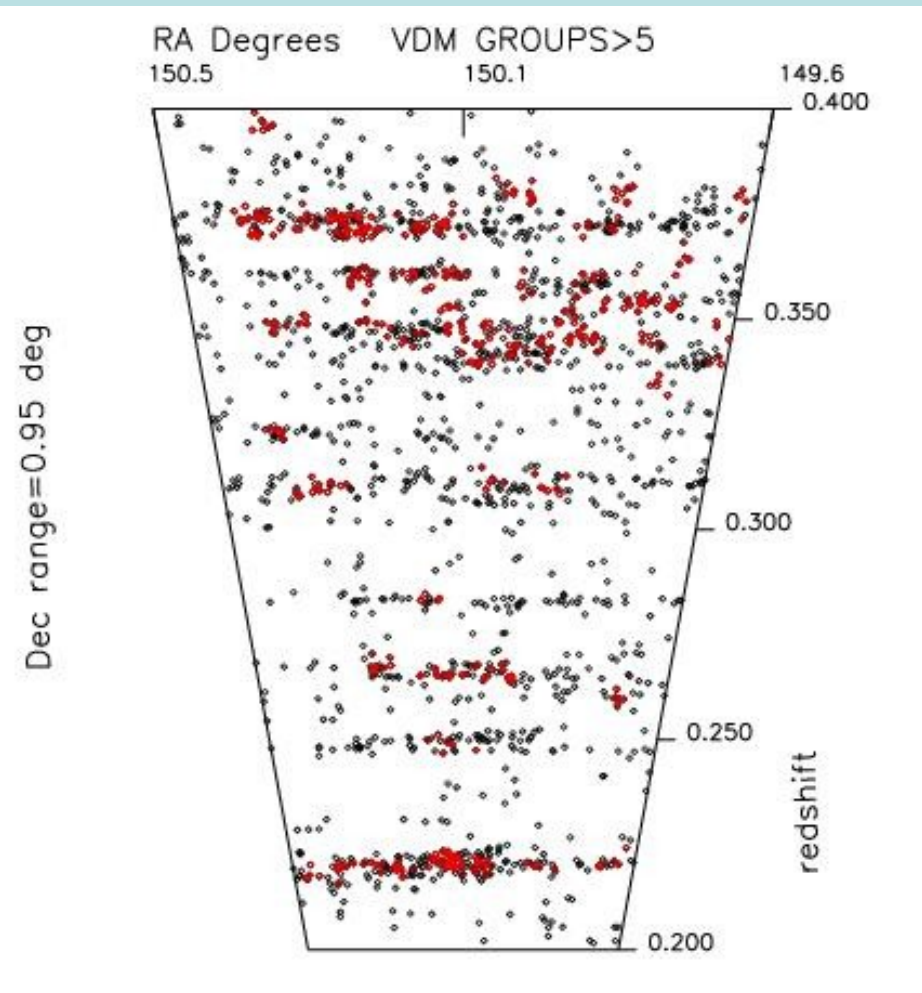
VDM groups/clusters reconstruction

Now *our*
cone ...



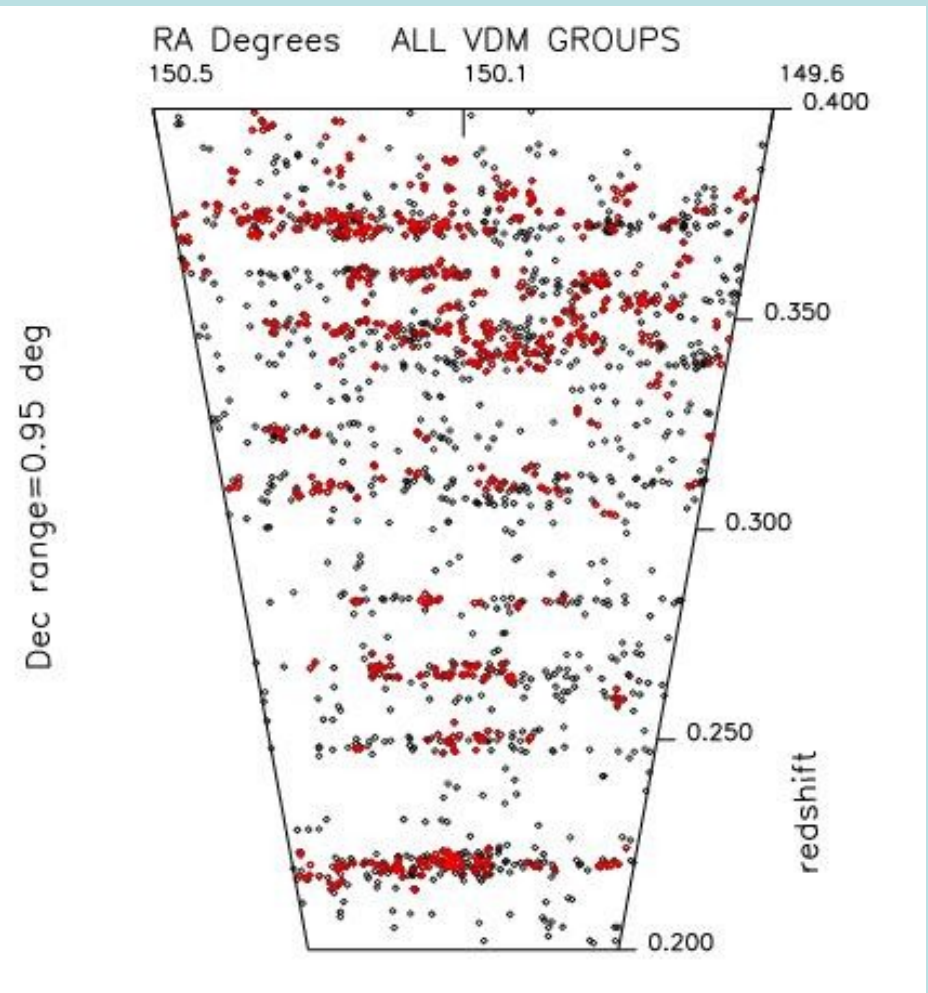
VDM groups/clusters reconstruction

Now *our*
cone ...



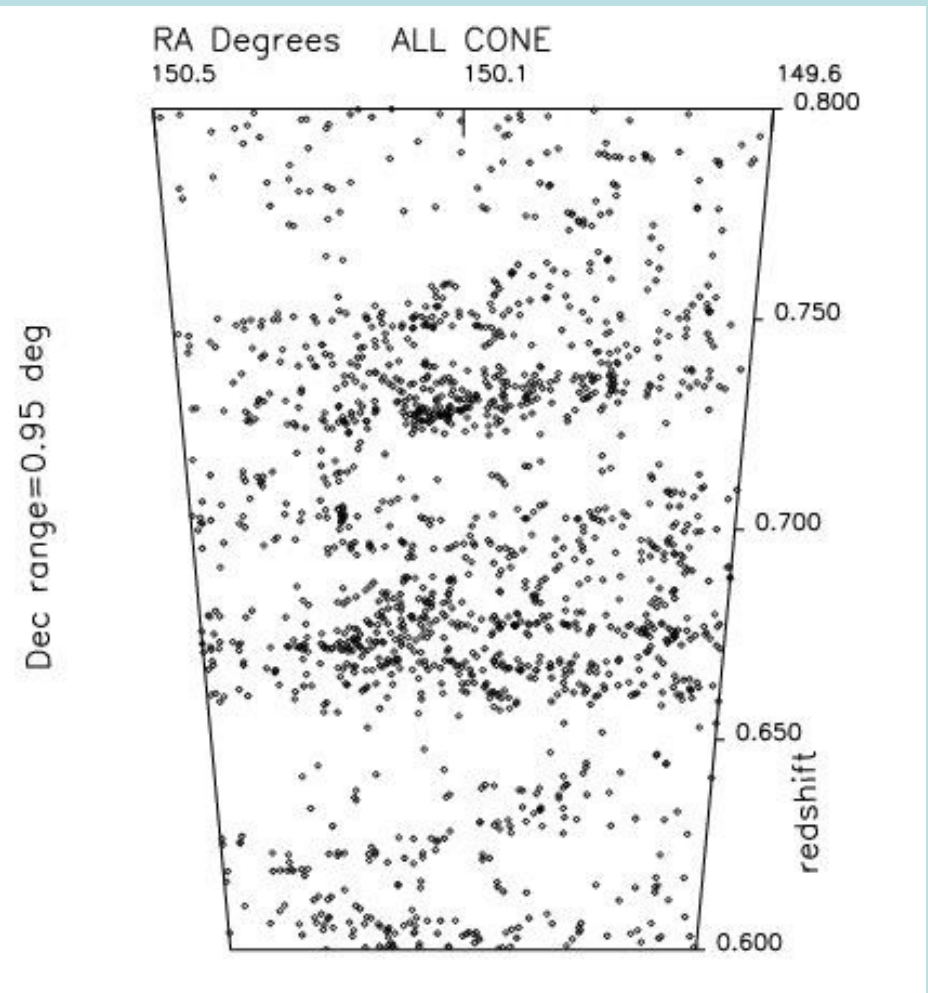
VDM groups/clusters reconstruction

Now *our*
cone ...



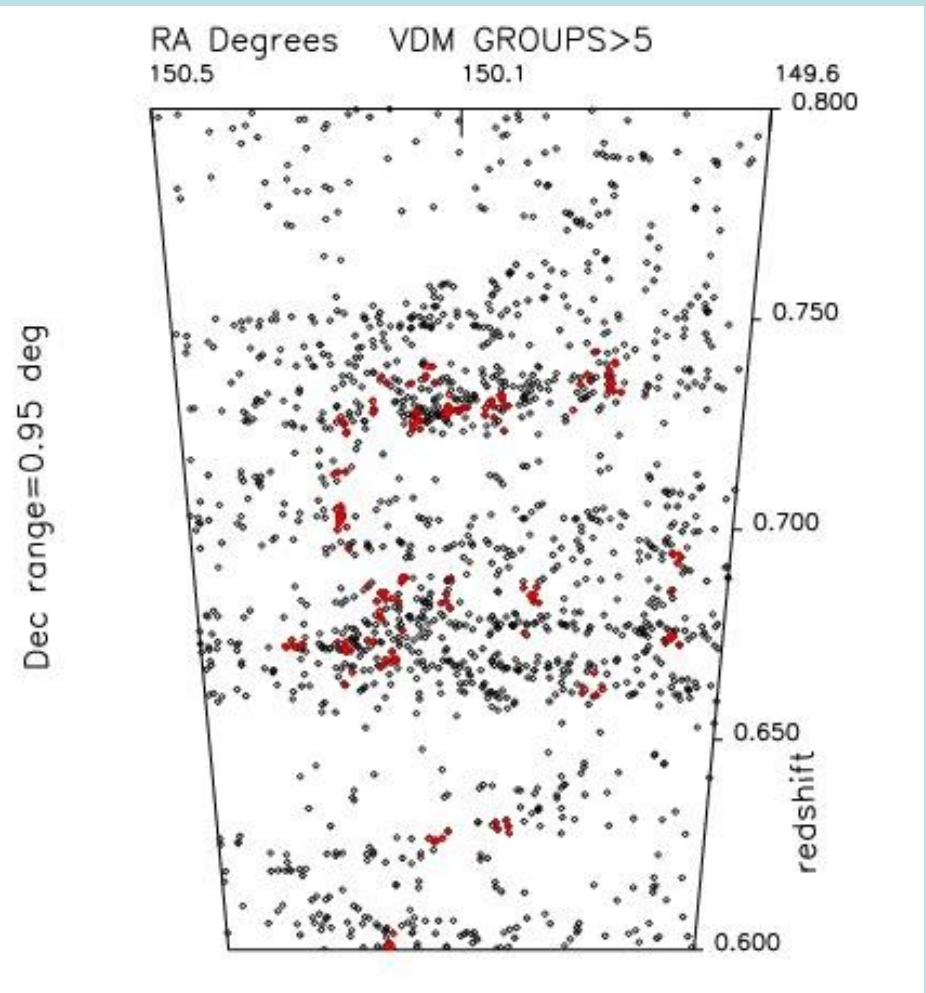
VDM groups/clusters reconstruction

Now *our*
cone ...



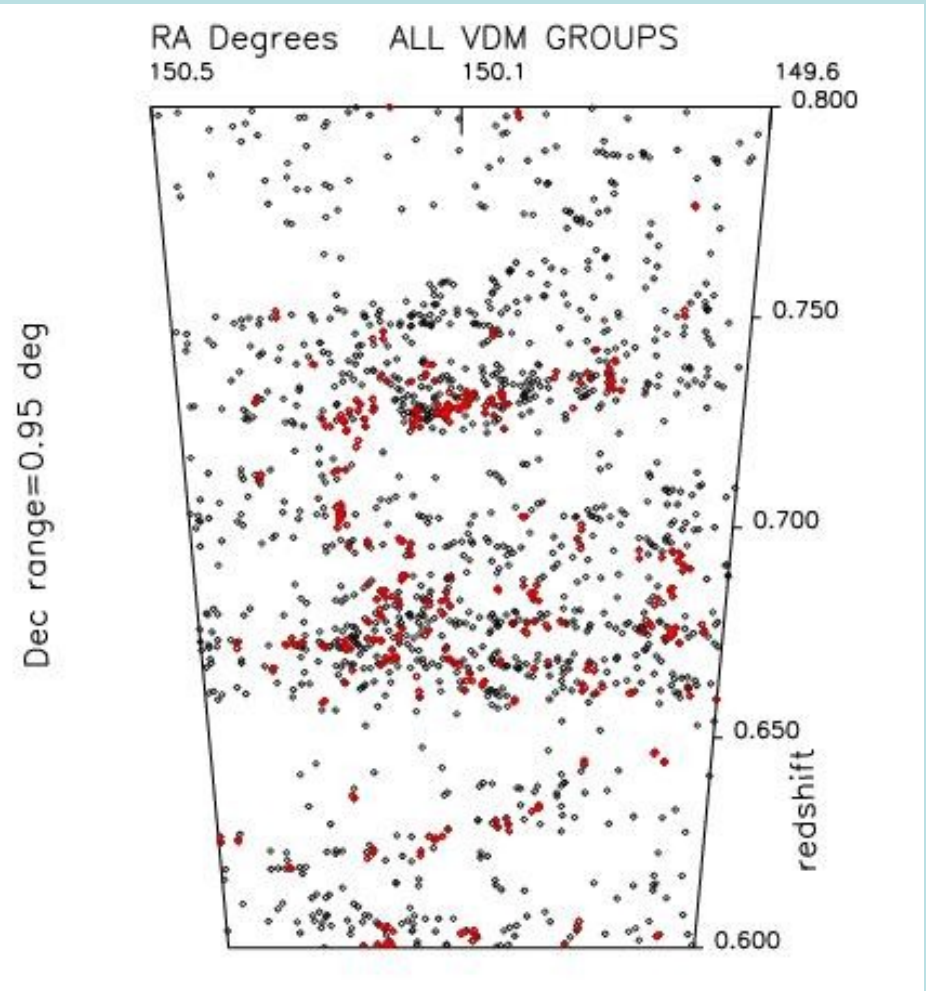
VDM groups/clusters reconstruction

Now *our*
cone ...



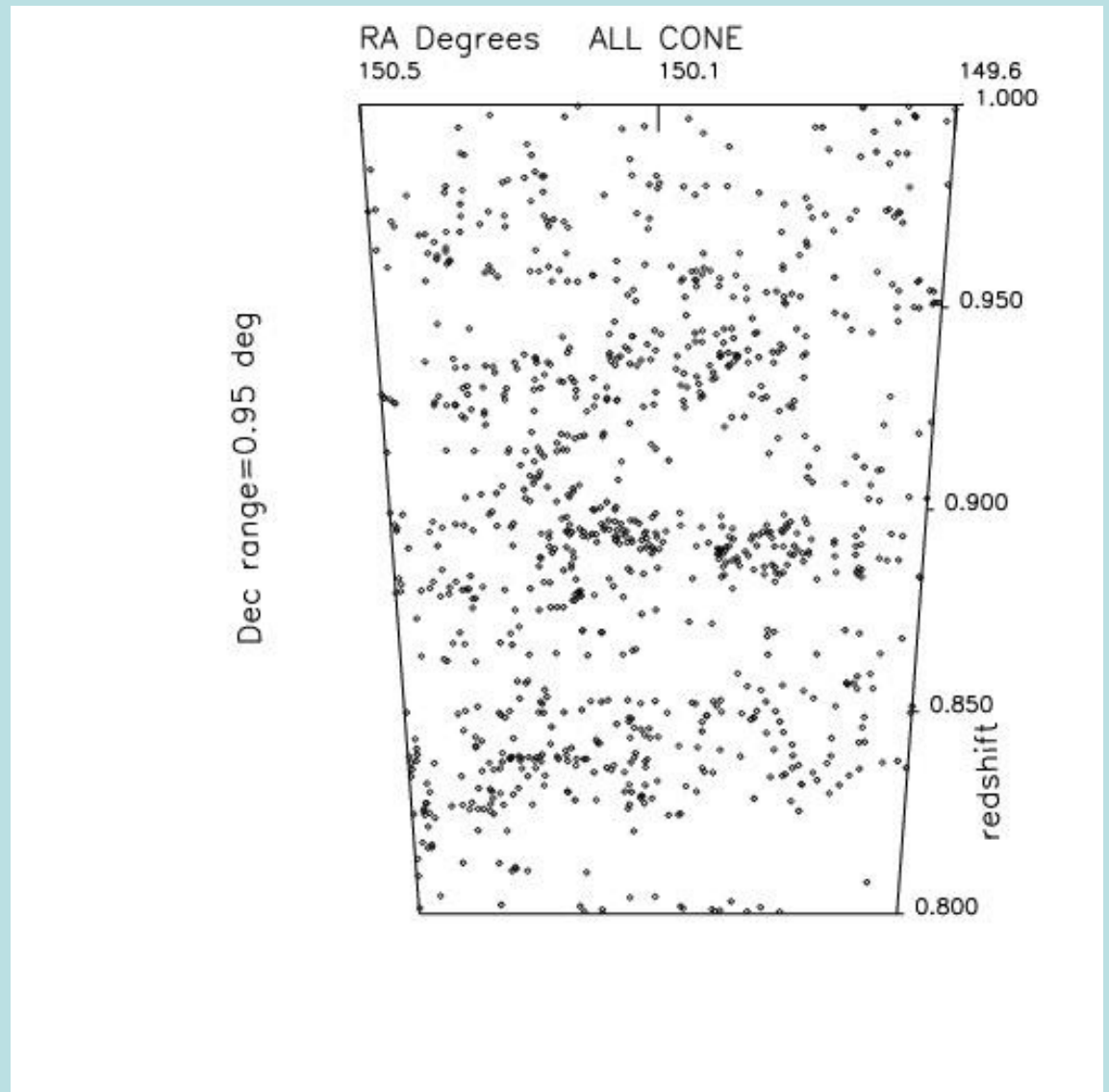
VDM groups/clusters reconstruction

Now *our*
cone ...



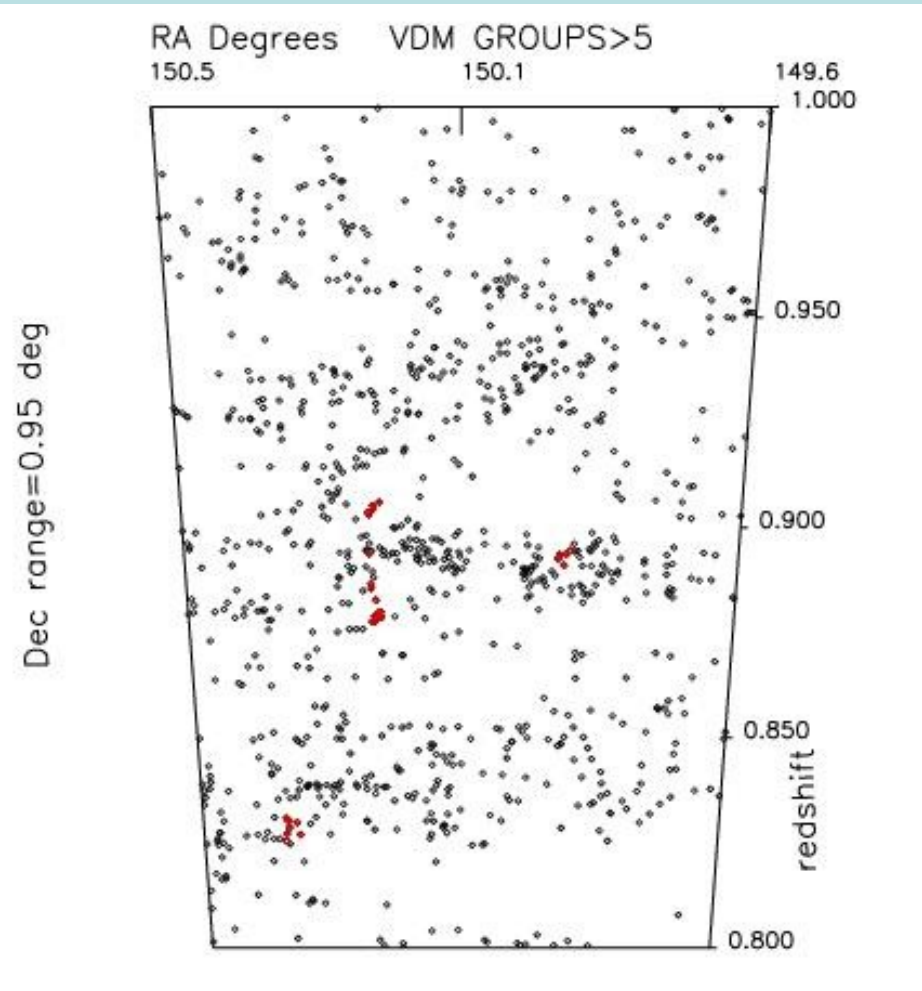
VDM groups/clusters reconstruction

Now *our*
cone ...



VDM groups/clusters reconstruction

Now *our*
cone ...



VDM groups/clusters reconstruction

Now *our*
cone ...

