SHAM implementations

EPFL - LABORATOIRE D'ASTROPHYSIQUE

My SHAM model has 3 parameters:

1. σ, controls the Vpeak-M* scatter (**Vpeak scattering**)
2. Vceil, prevent the most massive halos from having a galaxy (**Vpeak_scat truncation**)
3. Vsmear, smear the peculiar velocity for the z uncertainty

SHAM implementations

EPFL - LABORATOIRE D'ASTROPHYSIQUE

Vpeak scattering:

1. Gaussian scatter:

$$Vpeak\_scat = Vpeak*(1+N(0,\sigma_2))$$

2. positive scatter:

if $N(0,\sigma_2)>0$:

$$Vpeak\_scat = Vpeak*(1+N(0,\sigma_2))$$

else:

$$Vpeak\_scat = Vpeak*\exp\{N(0,\sigma_2)\}$$

Vpeak_scat truncation:

a. direct cut:

remove Vpeak_scat >Vceil

b. dsigma cut:

remove Vpeak_scat/σ >Vceil

SHAM for eBOSS LRG in SGC

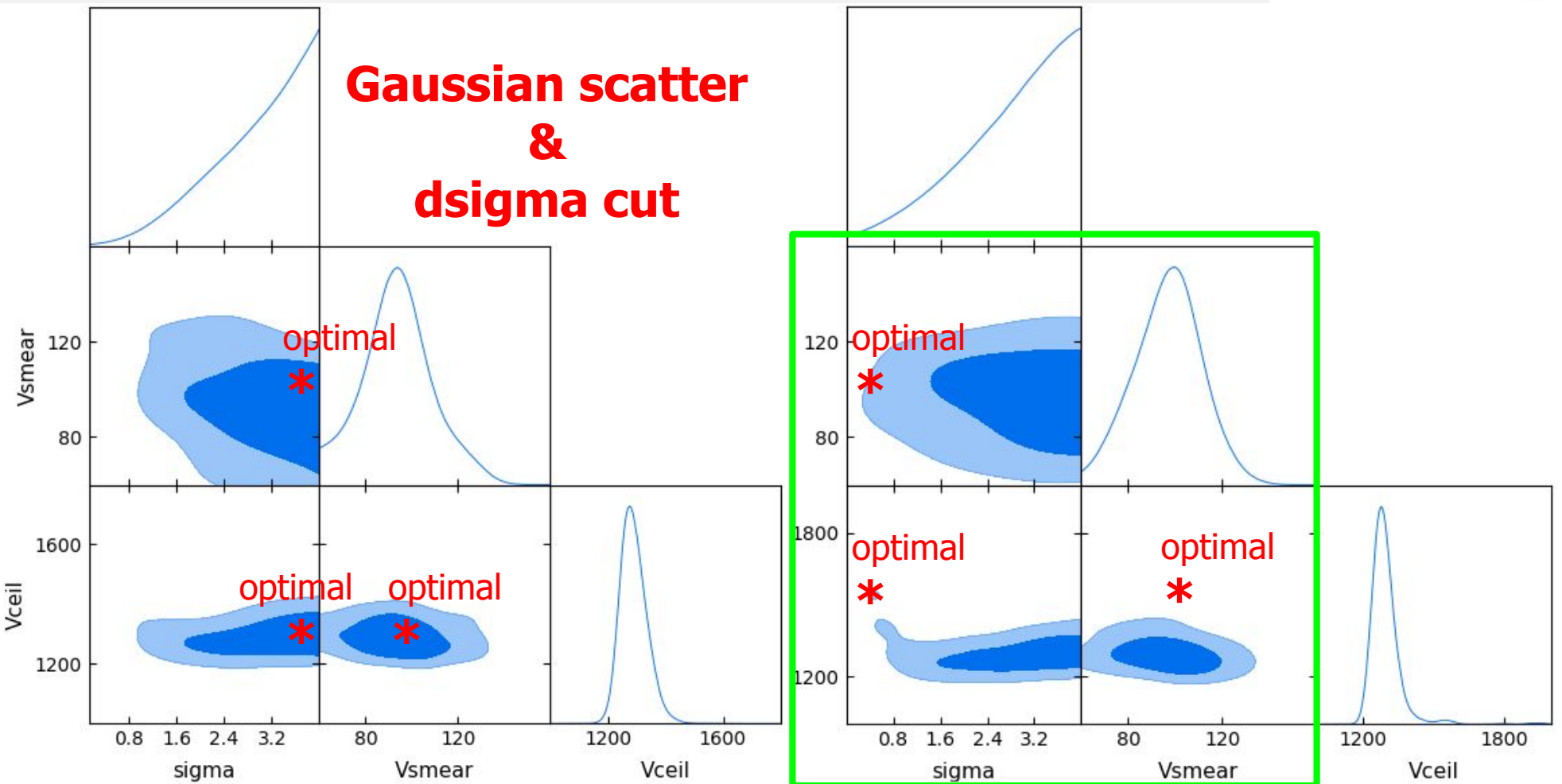
EPFL - LABORATOIRE D'ASTROPHYSIQUE

1. despite the large difference between optimal parameters, the **best-fit 2PCF multipoles have no big difference**
2. positive scatter + dsigma still presents **"L" shape**; the optimal parameters are far **beyond the 95%** confidence interval.

SHAM posteriors for LRG in SGC

EPFL - LABORATOIRE D'ASTROPHYSIQUE

Gaussian scatter
&
dsigma cut



priors:	[0, 4.0]	[60, 160]	[1000, 1800]	[0, 4.0]	[60, 160]	[1000, 2000]
optimal:	3.72	99	1310	0.53	108	1525
1σ interval:	[2.58, 4.0]	[80, 108]	[1270, 1546]	[1.76, 3.68]	[83, 110]	[1243 1335]
min chi2:	31.84				31.75	

SHAM for eBOSS LRG in SGC

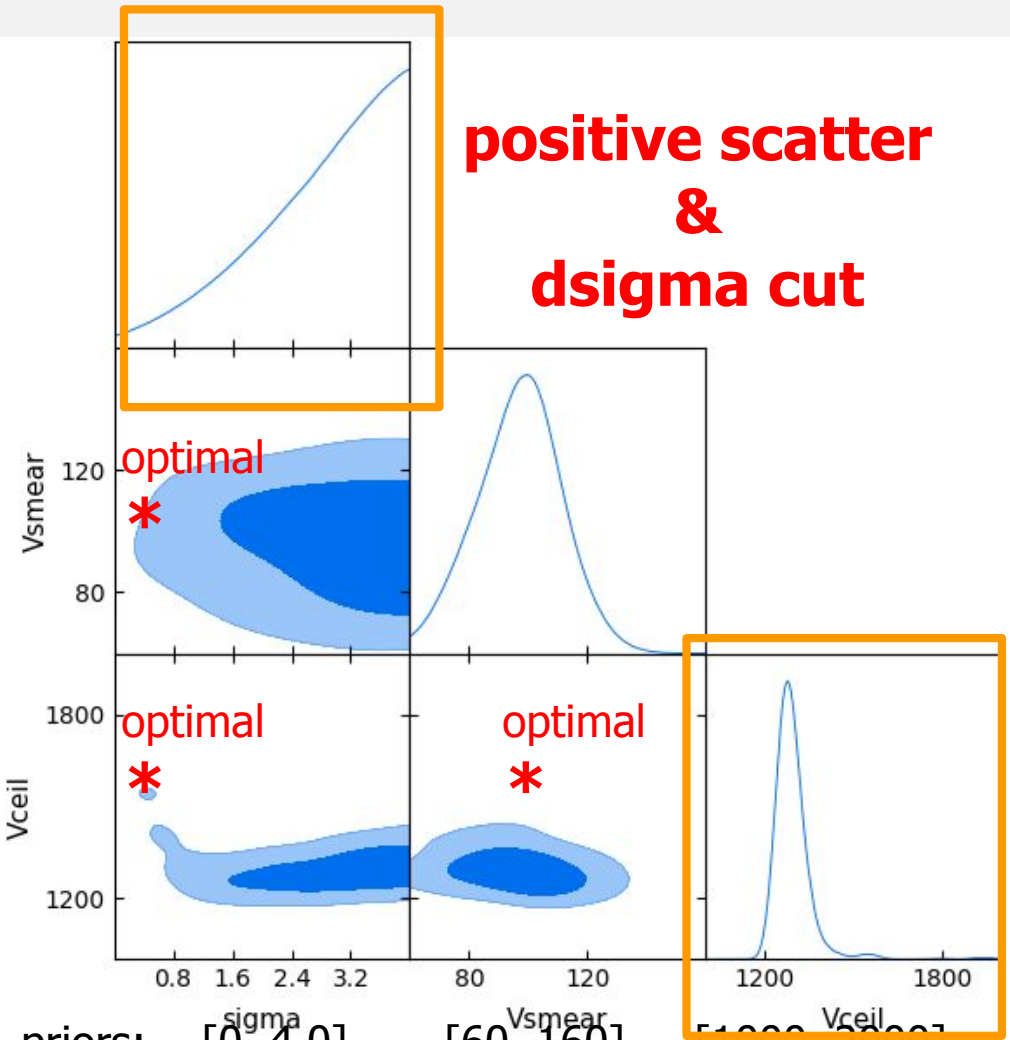
EPFL - LABORATOIRE D'ASTROPHYSIQUE

1. despite the large difference between optimal parameters, the **best-fit chi2 have no big difference**
2. positive scatter + dsigma still presents **"L" shape**;
   the optimal parameters are far **beyond the 95%** confidence interval.
3. the narrow posterior of **Vceil** is **at the cost of sigma** constraints

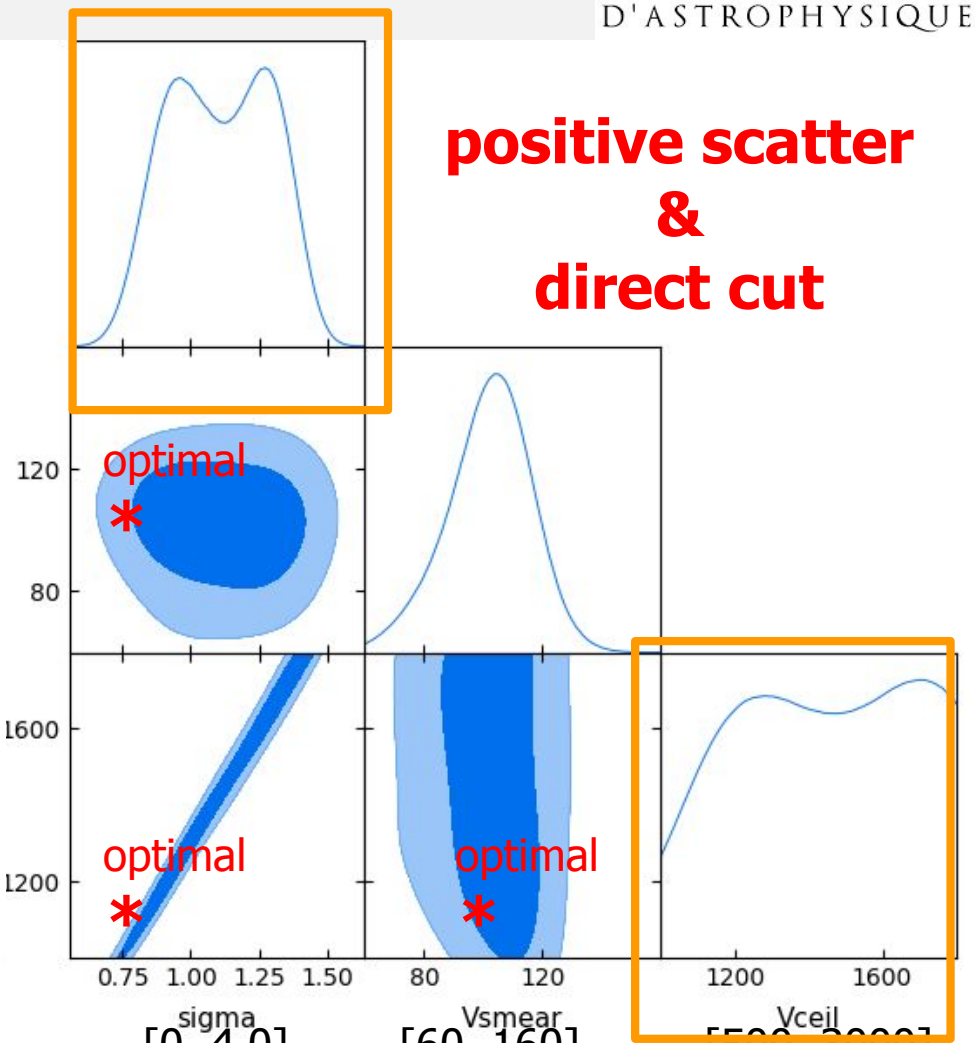
SHAM posteriors for LRG in SGC

EPFL - LABORATOIRE D'ASTROPHYSIQUE

positive scatter & dsigma cut



positive scatter & direct cut



priors:	[0, 4.0]	[60, 160]	[1000, 2000]	[0, 4.0]	[60, 160]	[500, 3000]
optimal:	0.53	108	1525	0.88	102	1176
1σ interval:	[1.76, 3.68]	[83, 110]	[1243 1335]	[0.89, 1.32]	[89, 116]	[1182, 1679]
min chi2:		31.75			31.50	

SHAM for eBOSS LRG in SGC

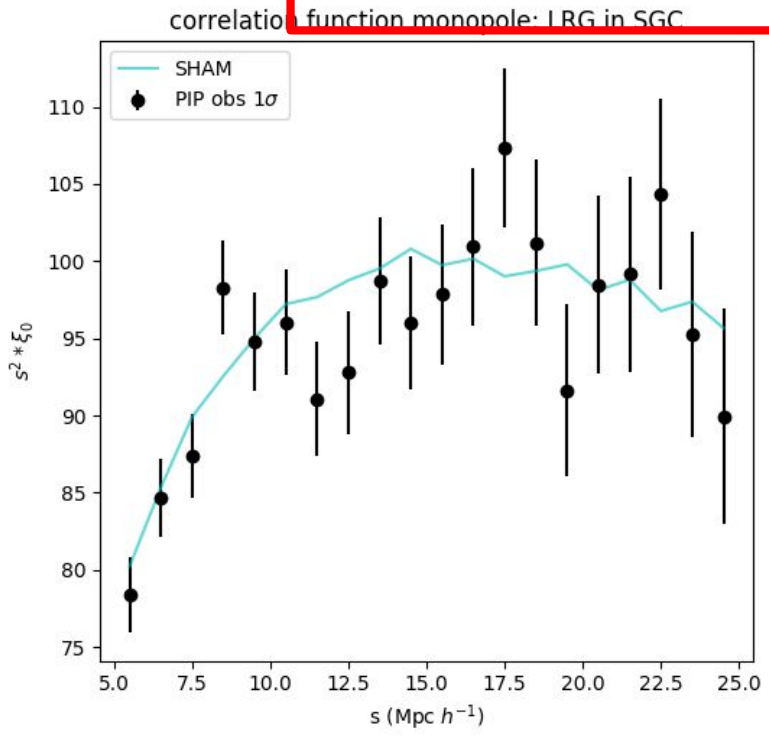
EPFL - LABORATOIRE D'ASTROPHYSIQUE

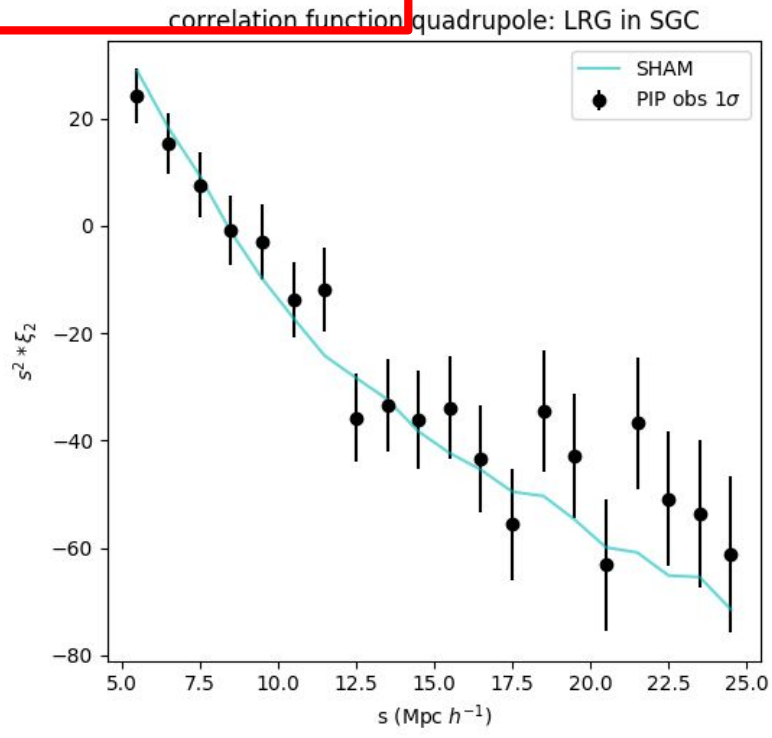
1. despite the large difference between optimal parameters, the **best-fit chi2 & 2PCF have no big difference**
2. positive scatter + dsigma still presents **"L" shape**;
   the optimal parameters are far **beyond the 95%** confidence interval.
3. the narrow posterior of **Vceil** is **at the cost of sigma** constraints

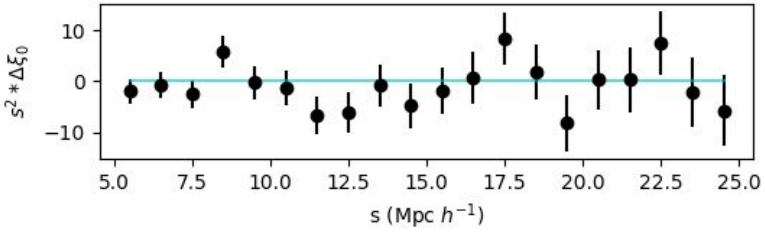
Optimal Multipoles for LRG in SGC

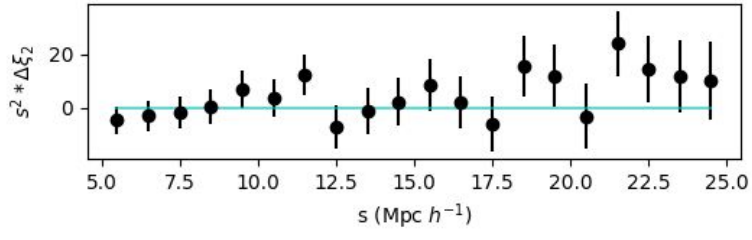
EPFL - LABORATOIRE D'ASTROPHYSIQUE

Gaussian scatter & dsigma cut





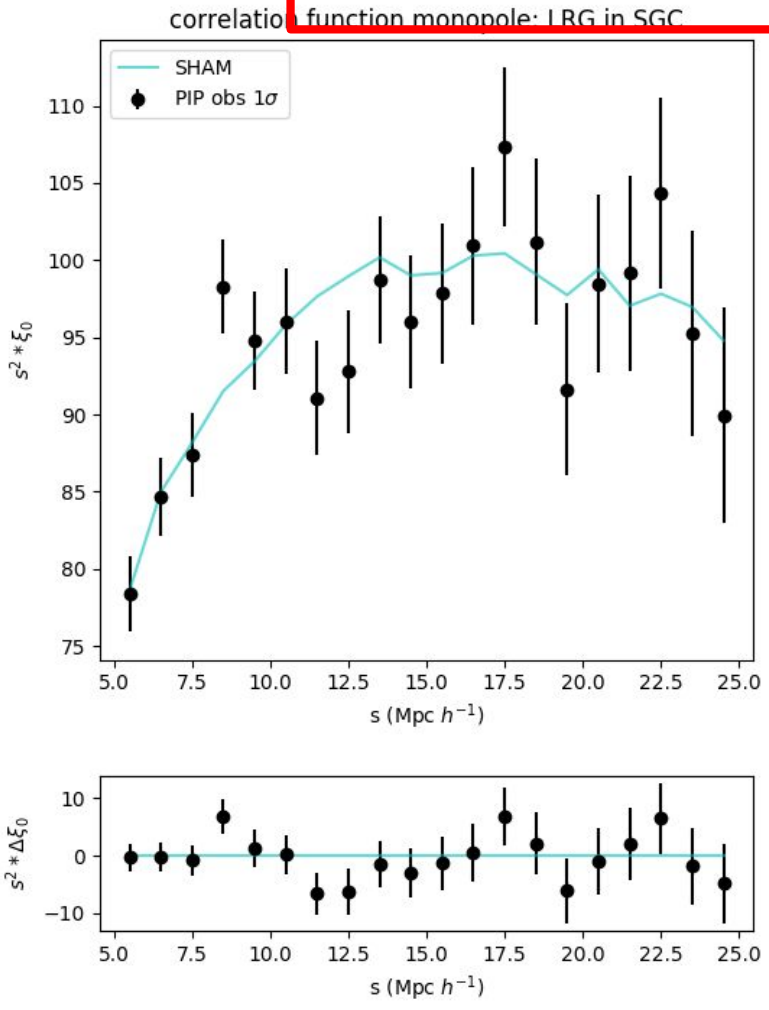


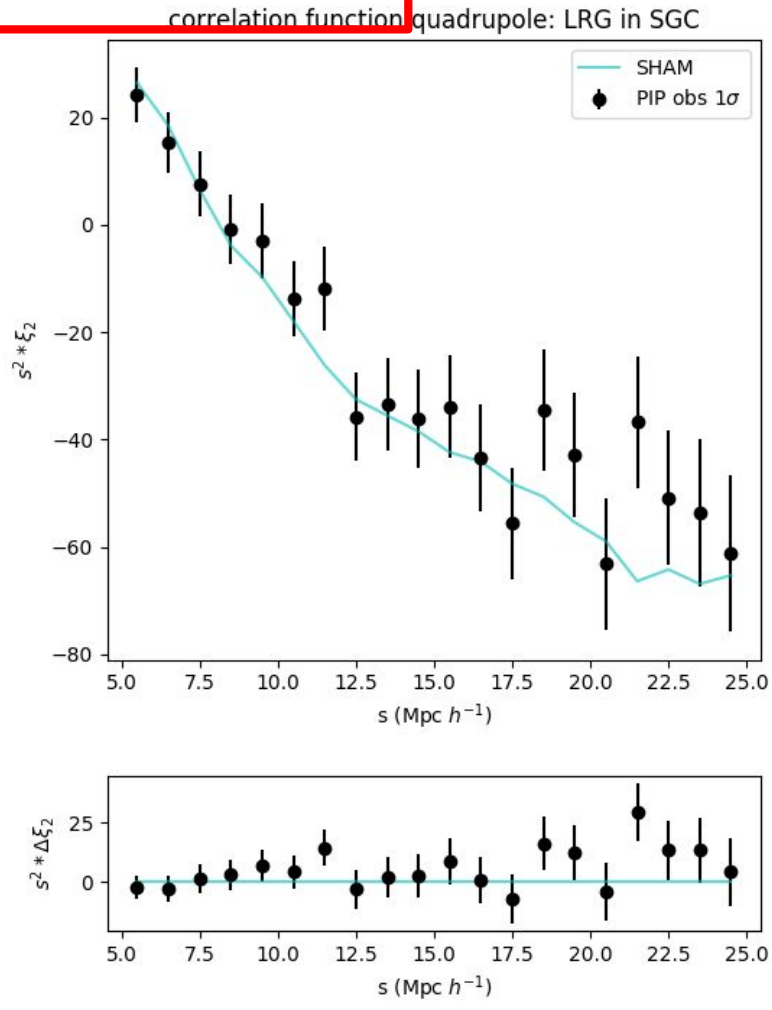


Optimal Multipoles for LRG in SGC

EPFL - LABORATOIRE D'ASTROPHYSIQUE

positive scatter & dsigma cut

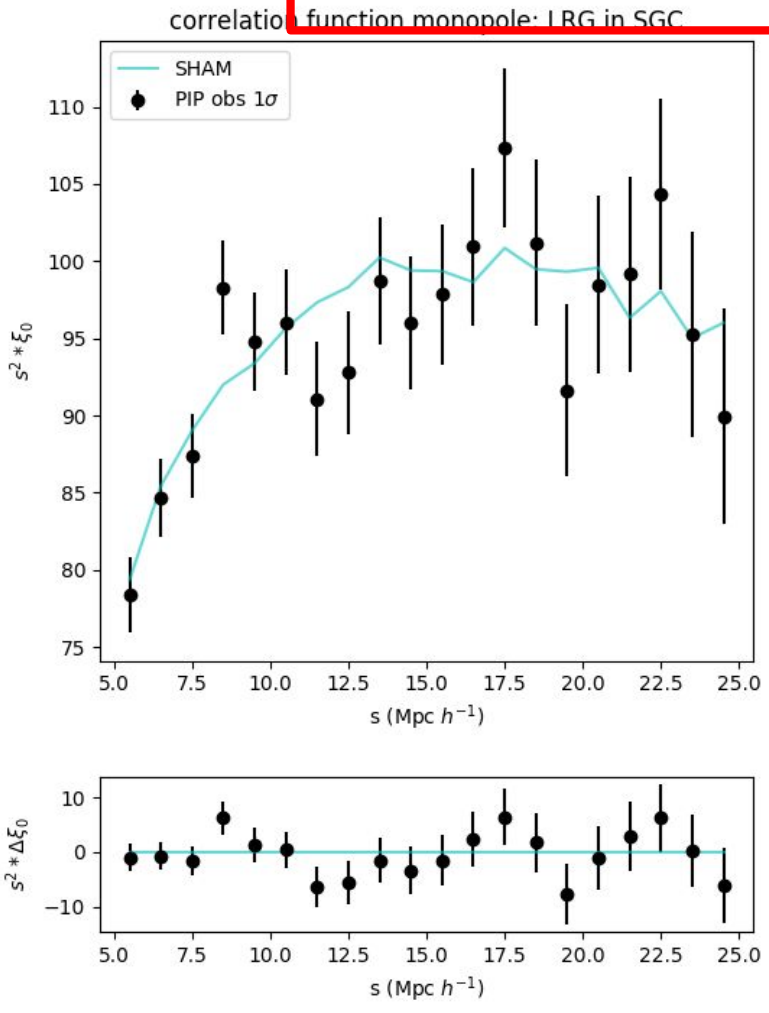


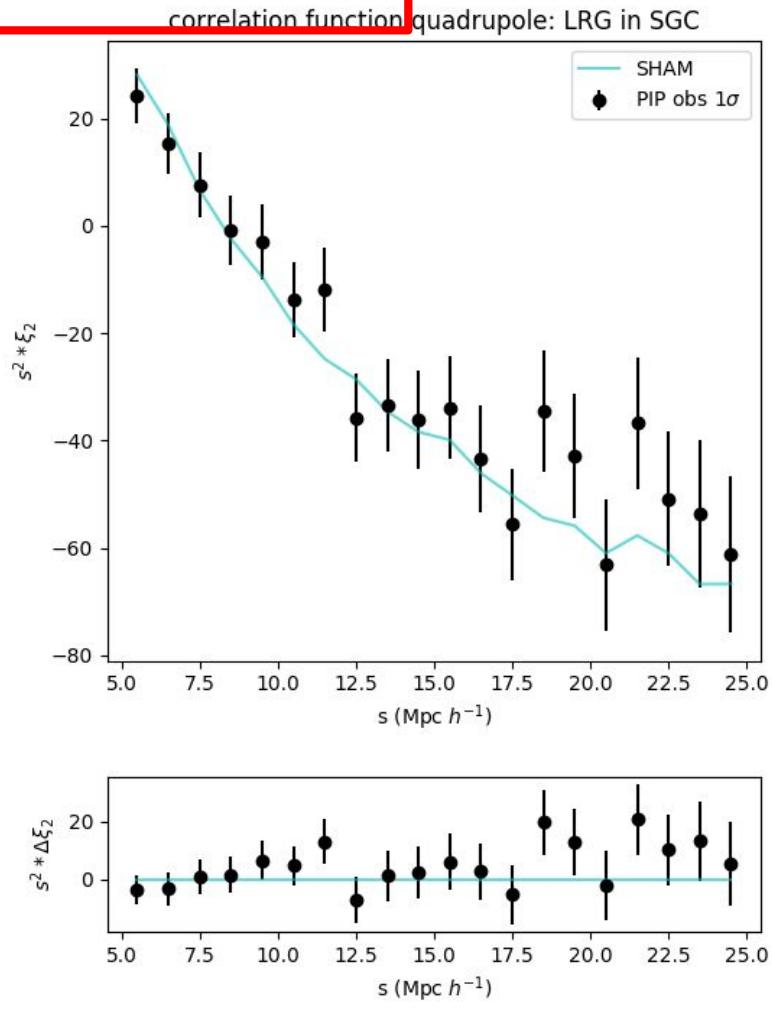


Optimal Multipoles for LRG in SGC

EPFL - LABORATOIRE D'ASTROPHYSIQUE

positive scatter & direct cut

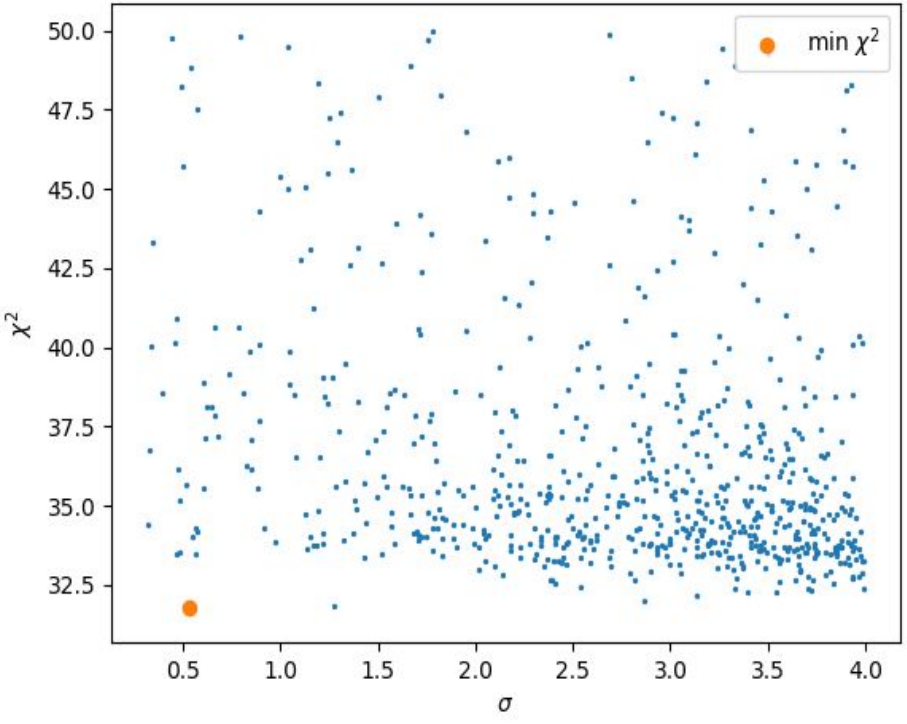


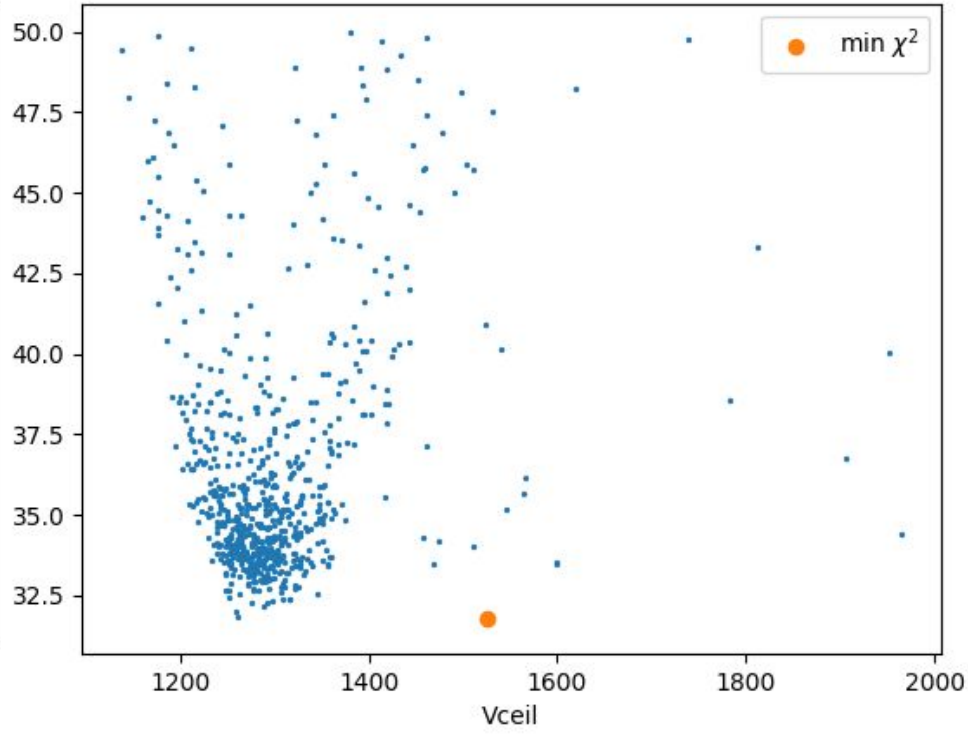


Optimal Parameter distributions

EPFL - LABORATOIRE D'ASTROPHYSIQUE

positive scatter & dsigma cut
optimal parameters beyond 3σ

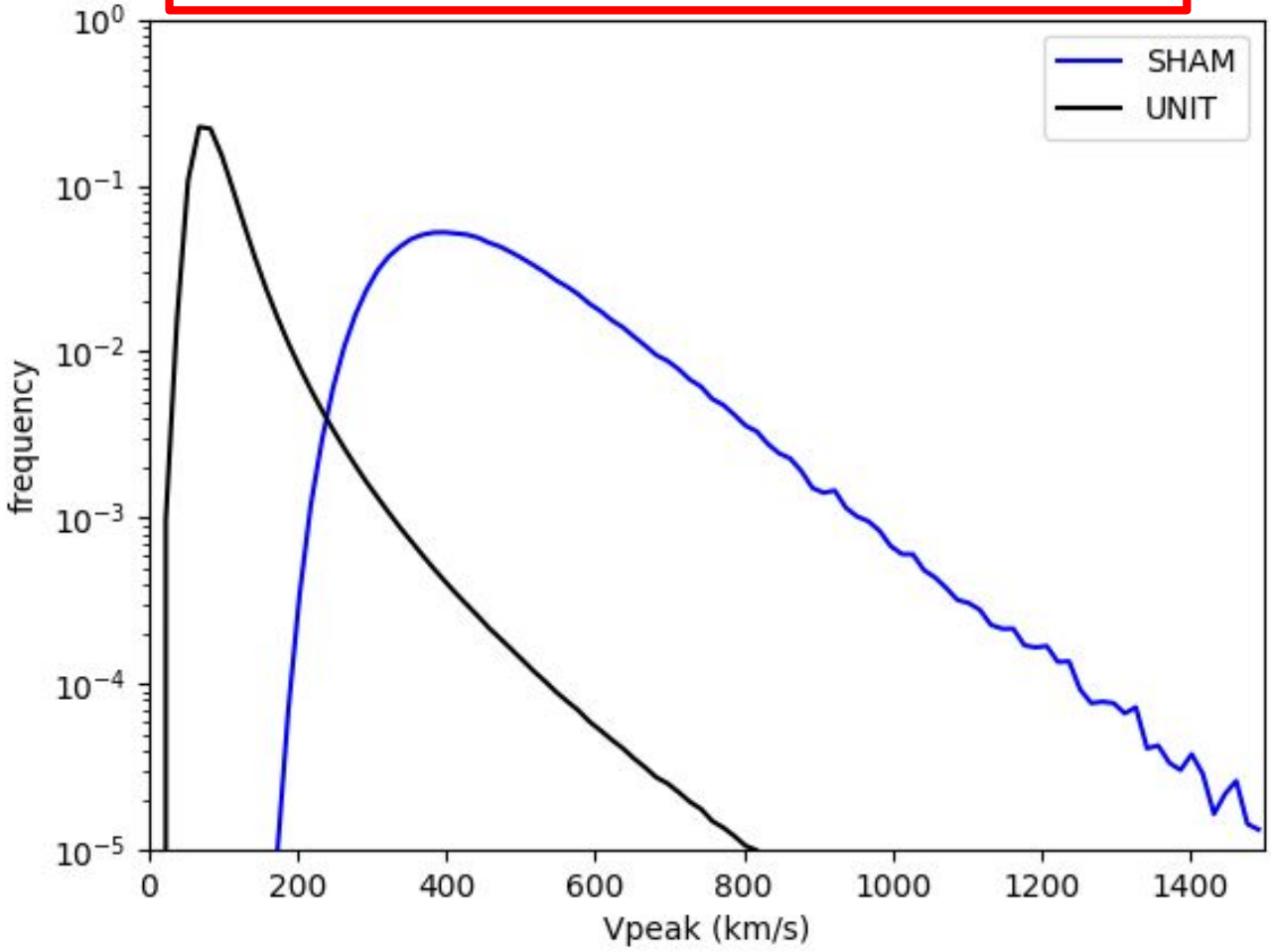




Optimal Vpeak distr. for LRG in SGC

EPFL - LABORATOIRE D'ASTROPHYSIQUE

Gaussian scatter & dsigma cut

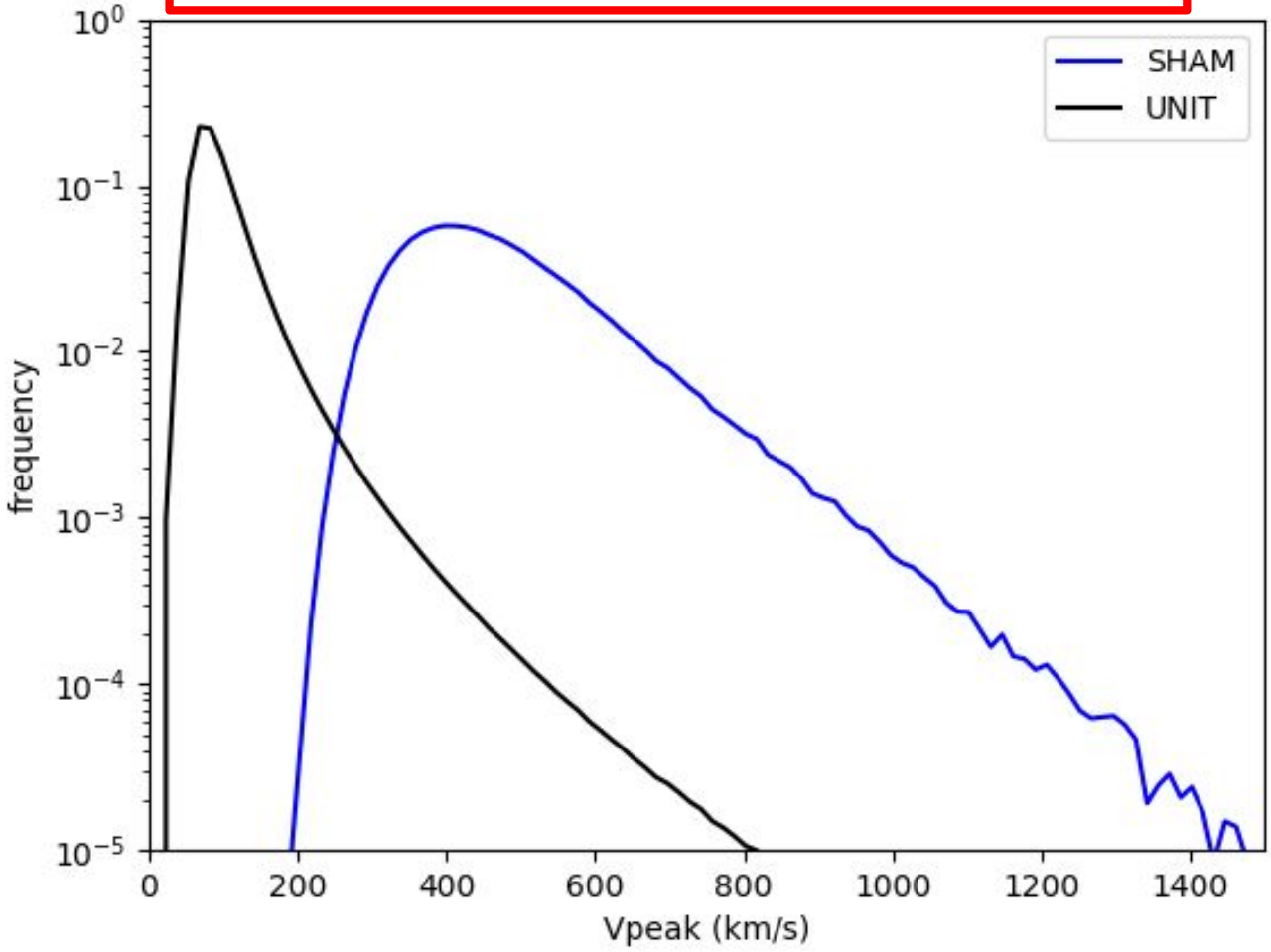


frequency = no. of SHAM halos in each bin/total no. of UNIT halos

Optimal Vpeak distr. for LRG in SGC

EPFL - LABORATOIRE D'ASTROPHYSIQUE

positive scatter & dsigma cut

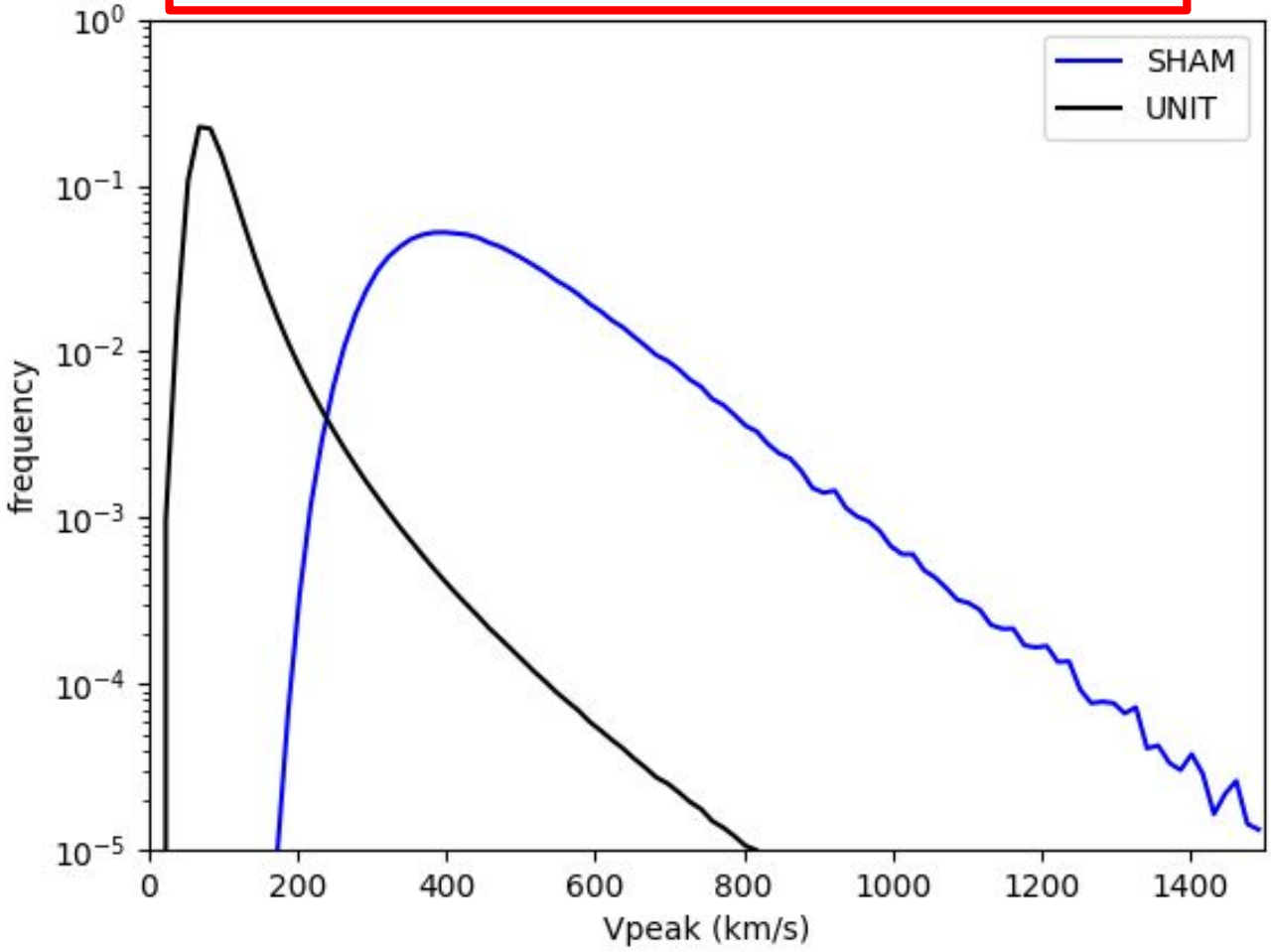


frequency = no. of SHAM halos in each bin/total no. of UNIT halos

Optimal Vpeak distr. for LRG in SGC

EPFL - LABORATOIRE D'ASTROPHYSIQUE

positive scatter & direct cut

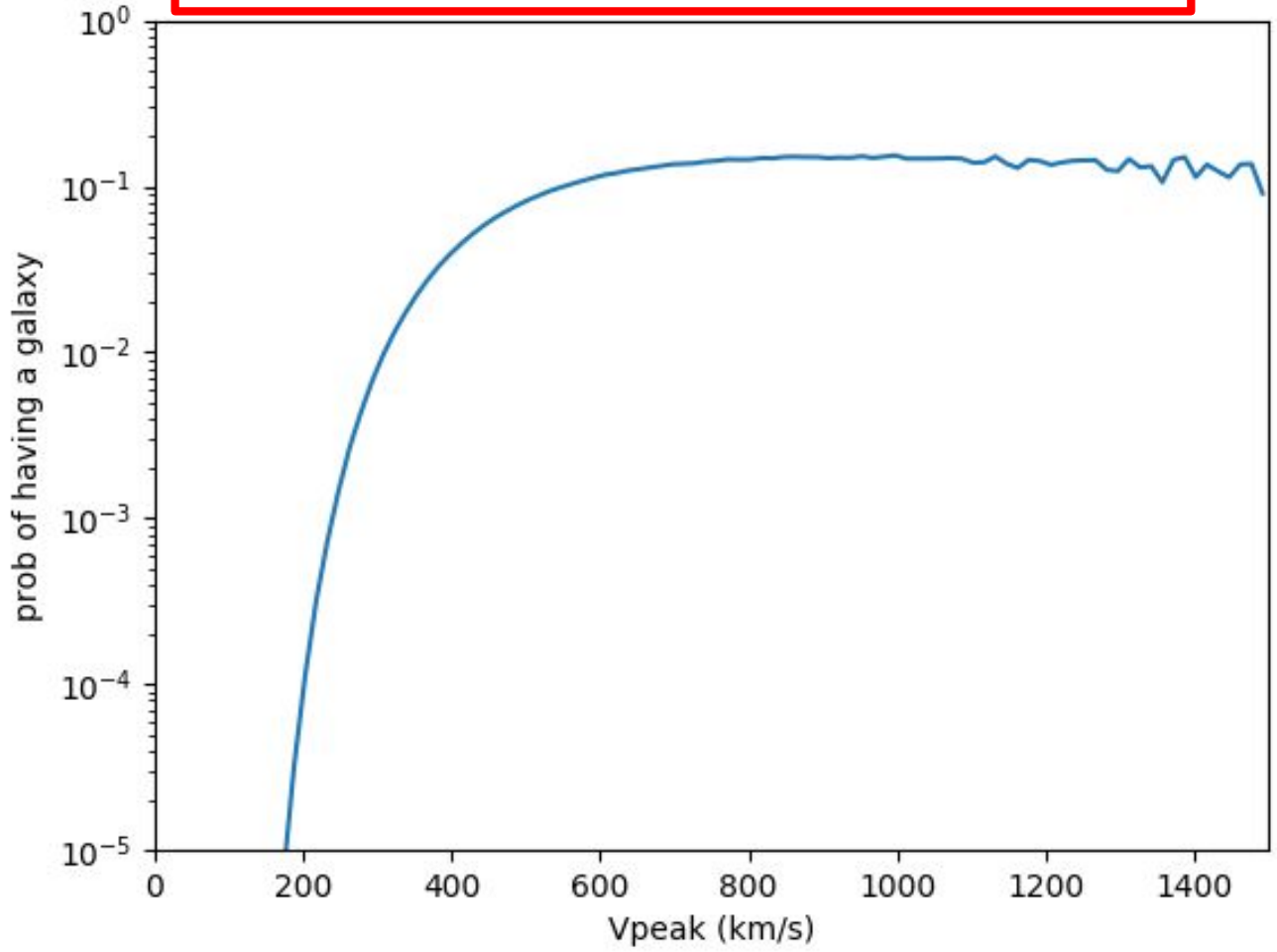


frequency = no. of SHAM halos in each bin/total no. of UNIT halos

Optimal halo PDF for LRG in SGC

EPFL - LABORATOIRE D'ASTROPHYSIQUE

Gaussian scatter & dsigma cut

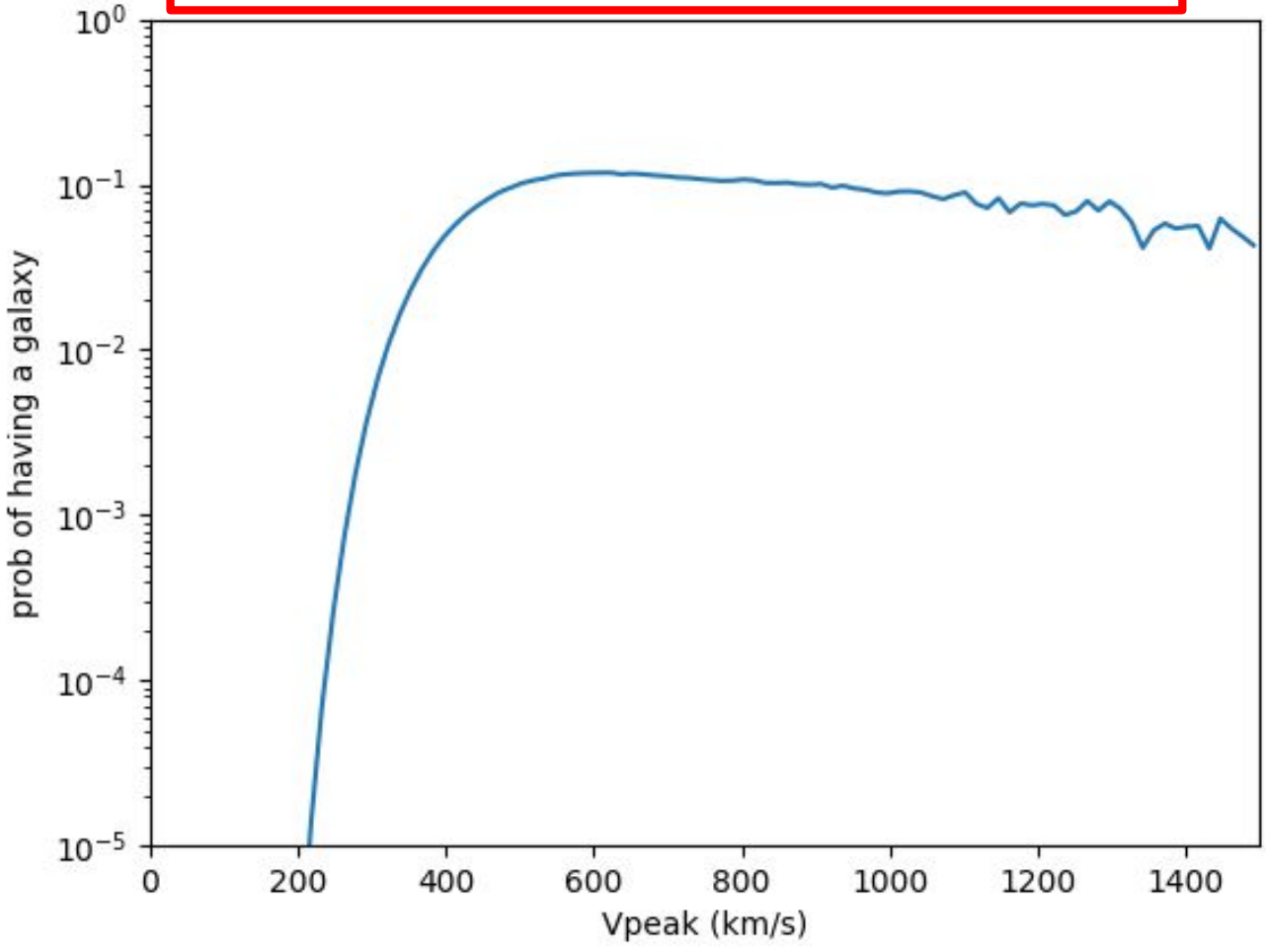


prob = no. of SHAM halos in each bin/no. of UNIT halos in each bin

Optimal halo PDF for LRG in SGC

EPFL - LABORATOIRE D'ASTROPHYSIQUE

positive scatter & dsigma cut

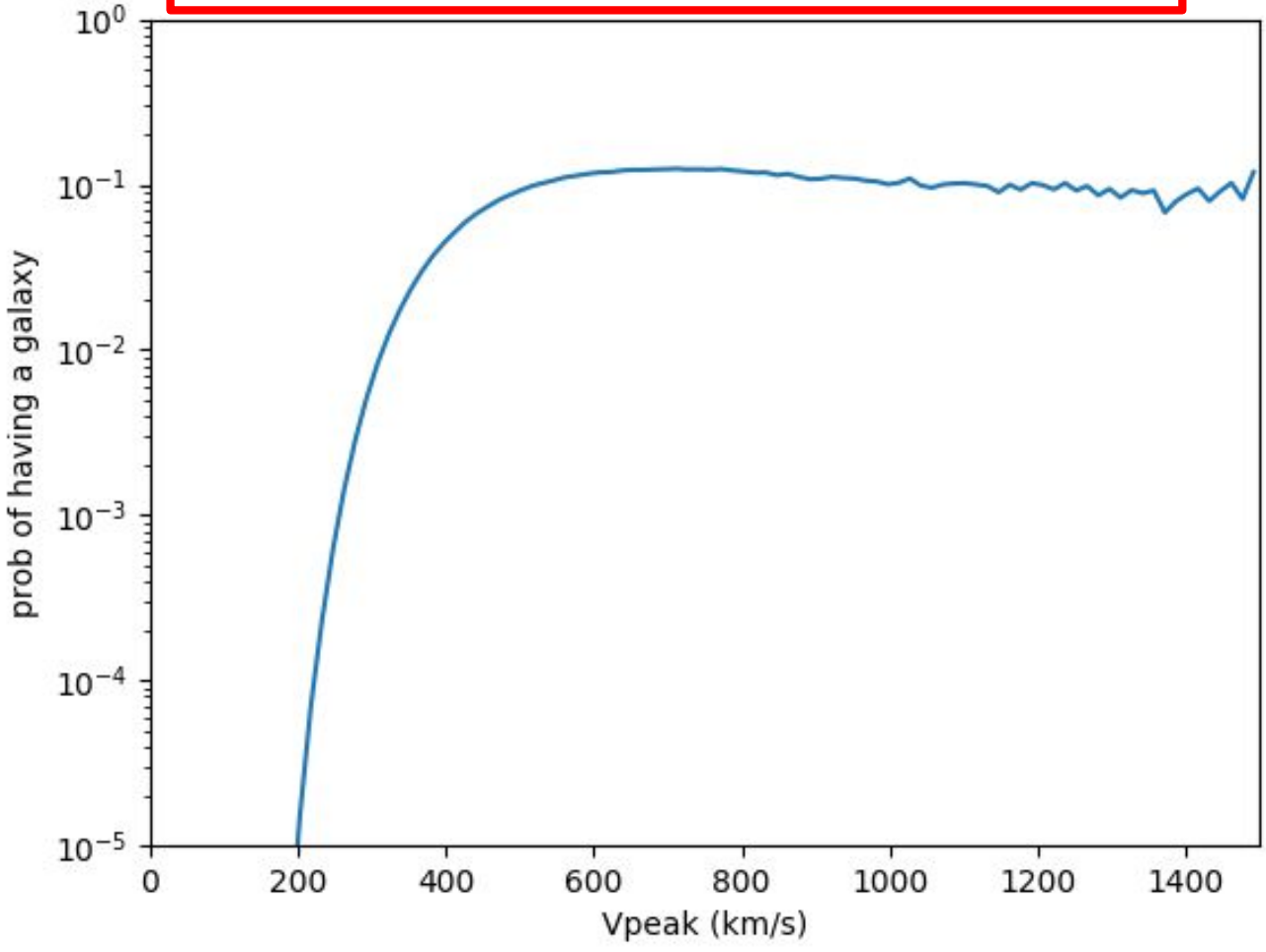


prob = no. of SHAM halos in each bin/no. of UNIT halos in each bin

Optimal halo PDF for LRG in SGC

EPFL - LABORATOIRE D'ASTROPHYSIQUE

positive scatter & direct cut



prob = no. of SHAM halos in each bin/no. of UNIT halos in each bin

SHAM for eBOSS LRG in SGC

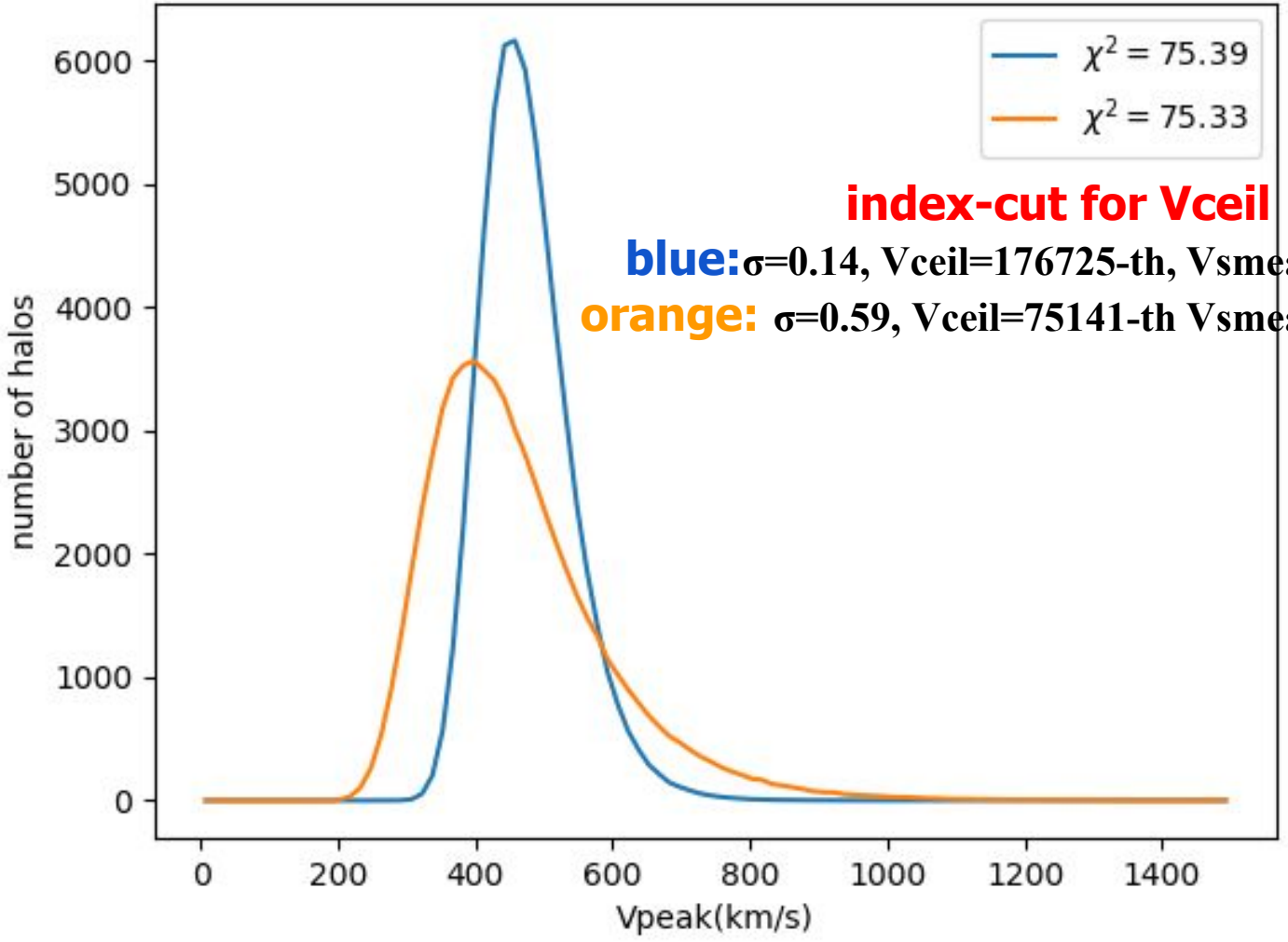
EPFL - LABORATOIRE D'ASTROPHYSIQUE

1. despite the large difference between optimal parameters, the **best-fit catalogues have no big difference (hint: close-chi2 tests), so we'd better choose one that produces a better posterior**
2. positive scatter + dsigma still presents **"L" shape**; the optimal parameters are far **beyond the 95%** confidence interval.
3. the narrow posterior of **Vceil** is **at the cost of sigma** constraints

Reminder: Close-chi2 tests

EPFL - LABORATOIRE D'ASTROPHYSIQUE

halo PDF



index-cut for Vceil

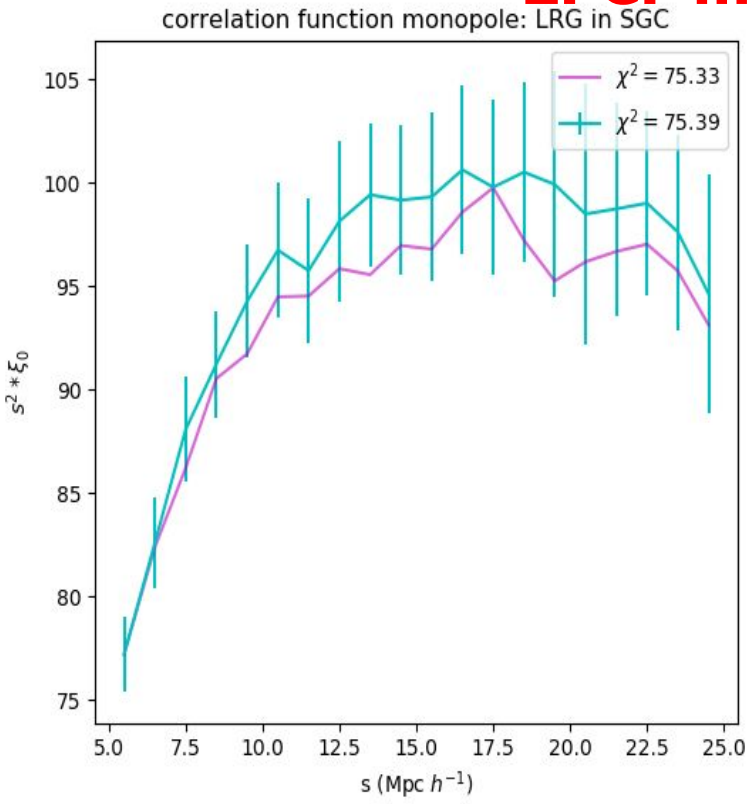
blue: **σ=0.14, Vceil=176725-th, Vsmear=131km/s**

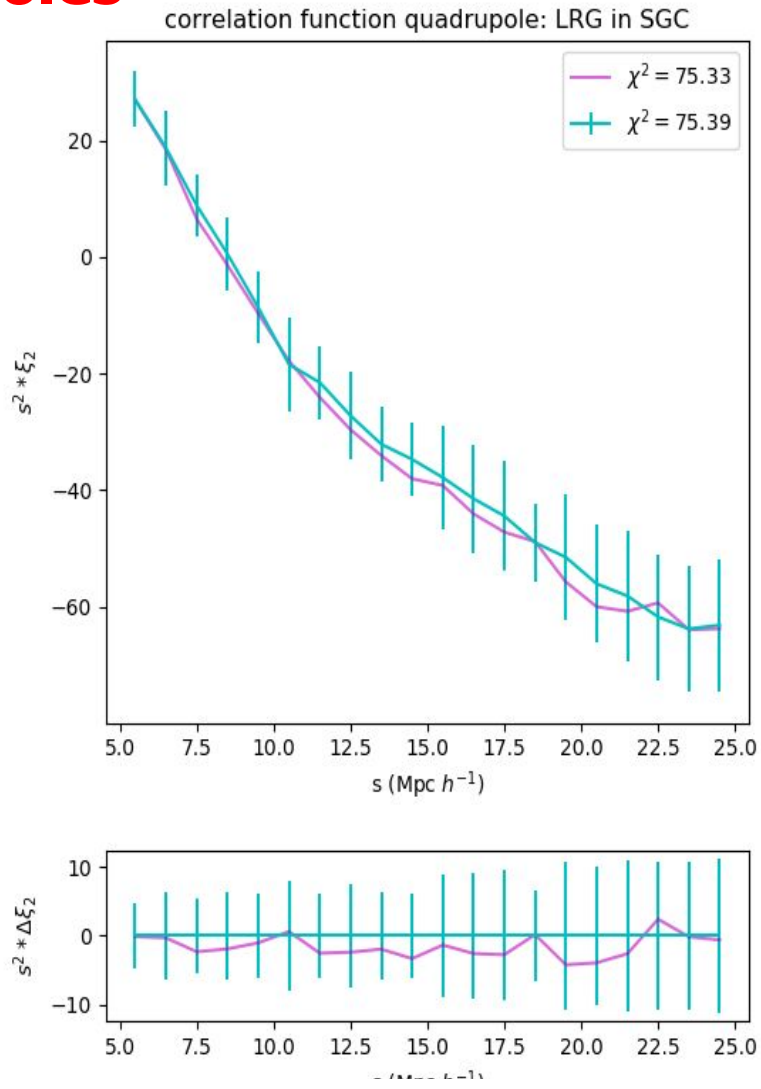
orange: **σ=0.59, Vceil=75141-th Vsmear=110km/s**

Reminder: Close-chi2 tests

EPFL - LABORATOIRE D'ASTROPHYSIQUE

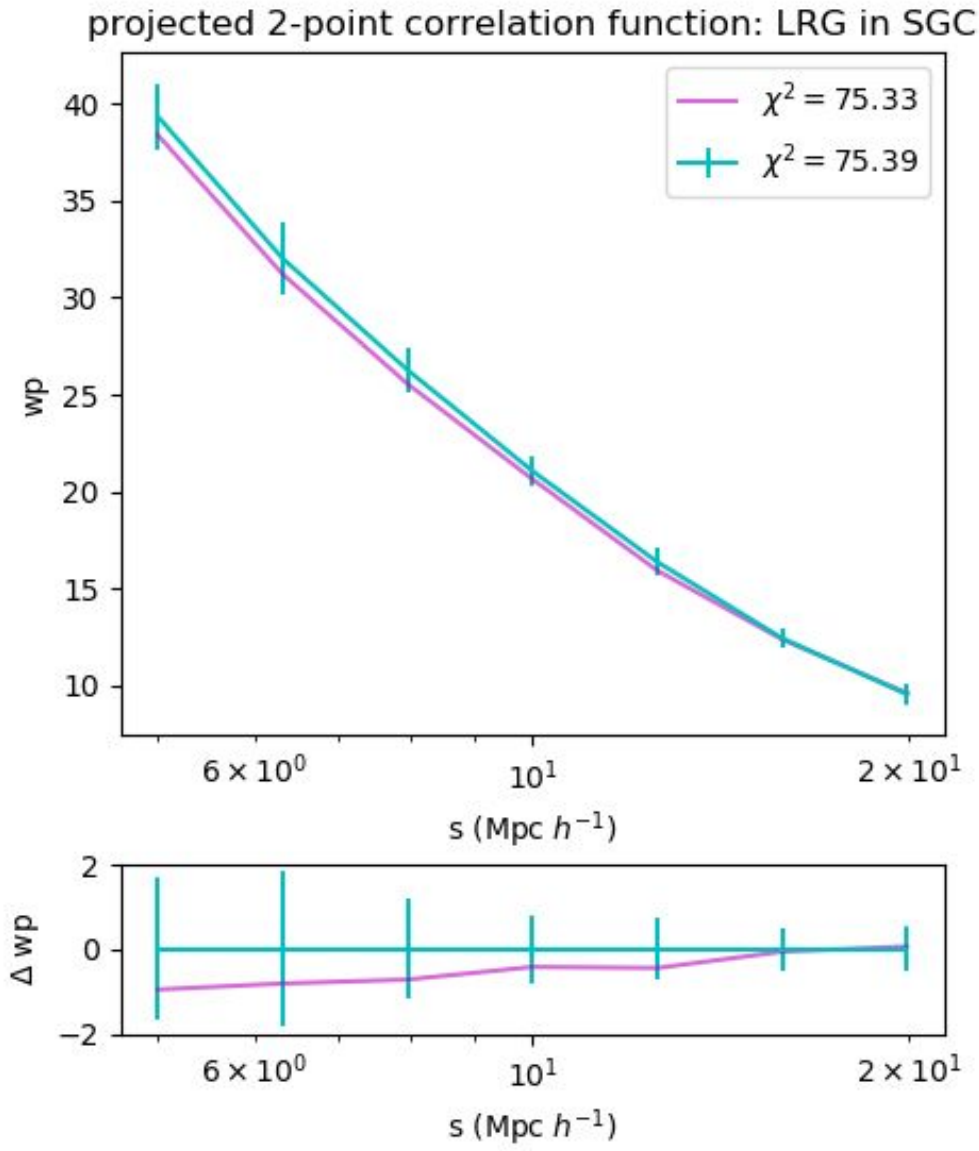
2PCF multipoles





Reminder: Close-chi2 tests

EPFL - LABORATOIRE D'ASTROPHYSIQUE

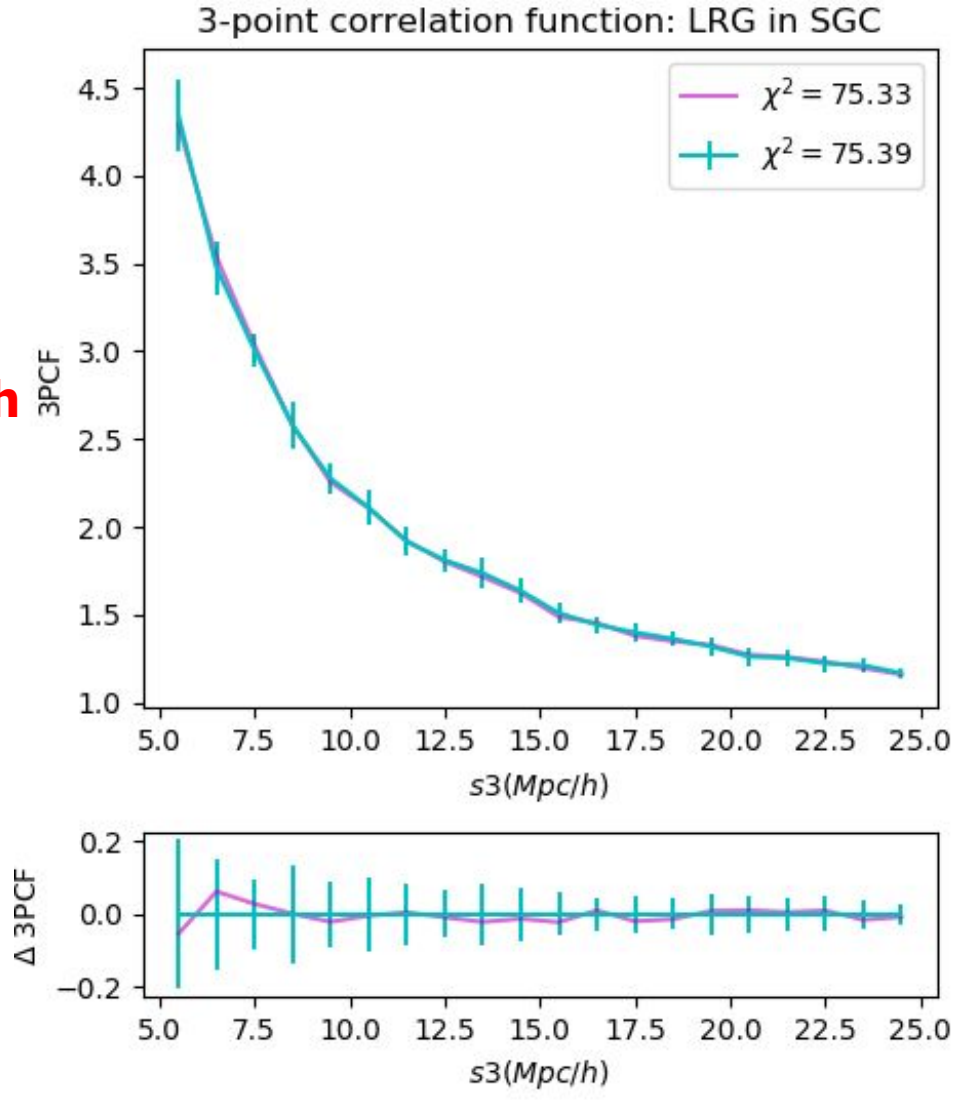


Reminder: Close-chi2 tests

EPFL - LABORATOIRE D'ASTROPHYSIQUE

s1 = [5, 15] Mpc/h

s2 = [15, 25] Mpc/h



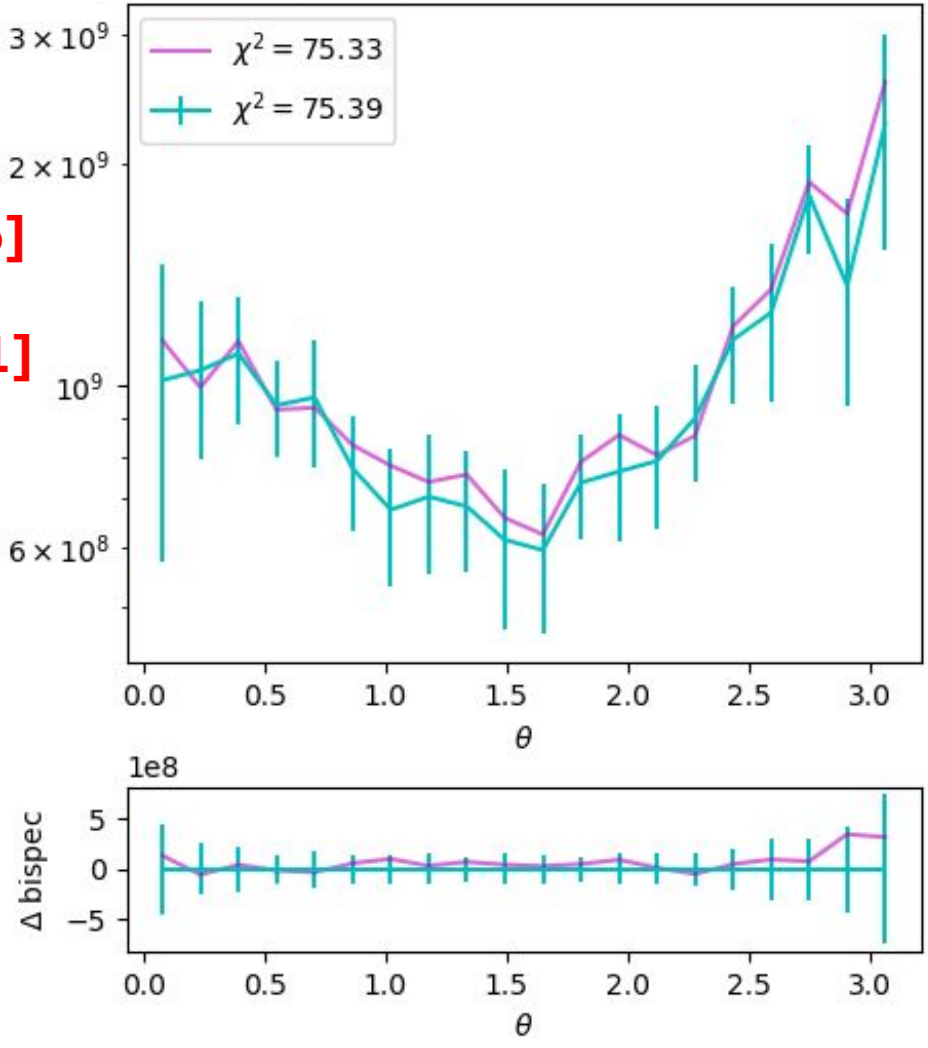
Reminder: Close-chi2 tests

EPFL - LABORATOIRE D'ASTROPHYSIQUE

bispectrum

K1 = [0.04, 0.06]

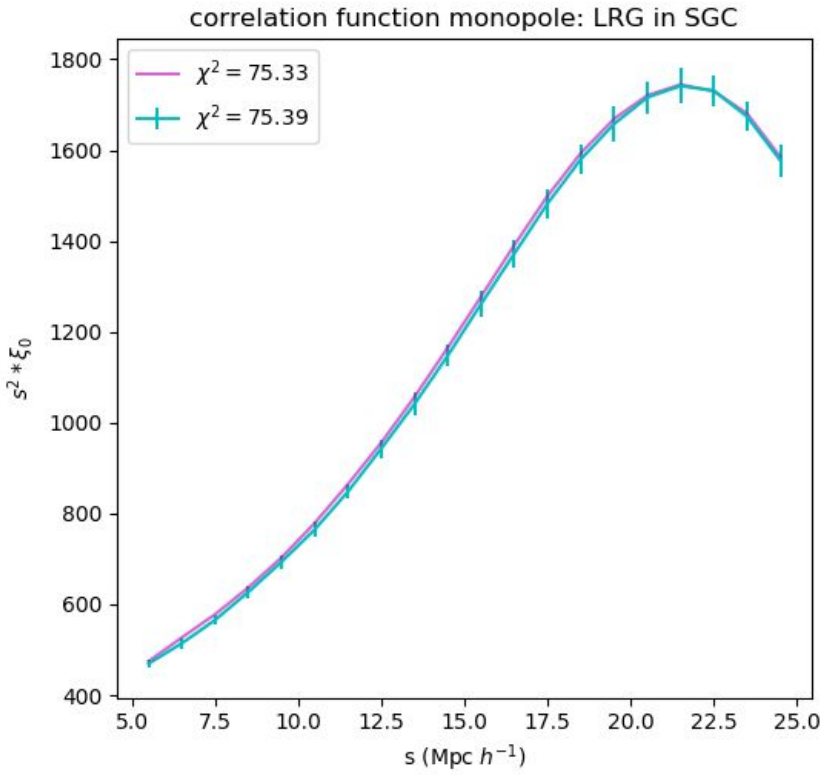
K2 = [0.09, 0.11]

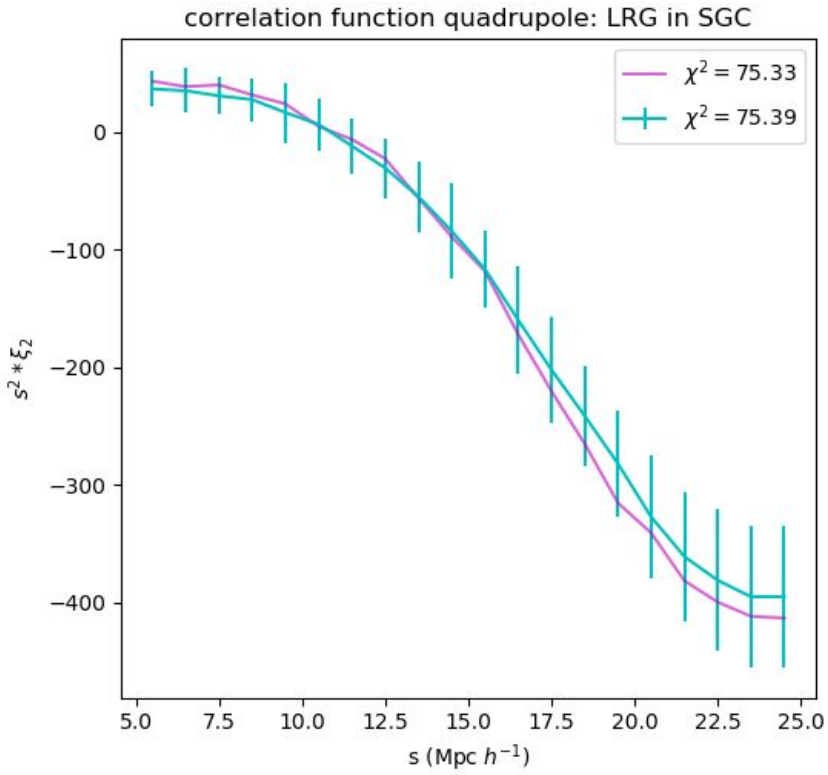


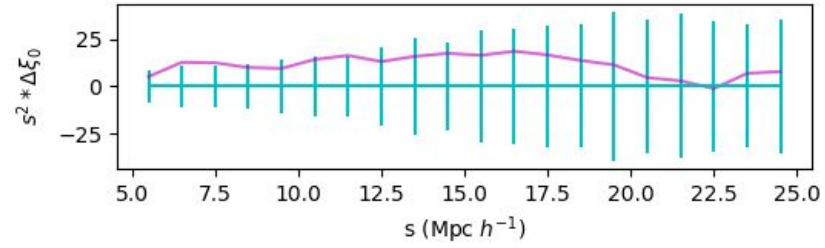
Reminder: Close-chi2 tests

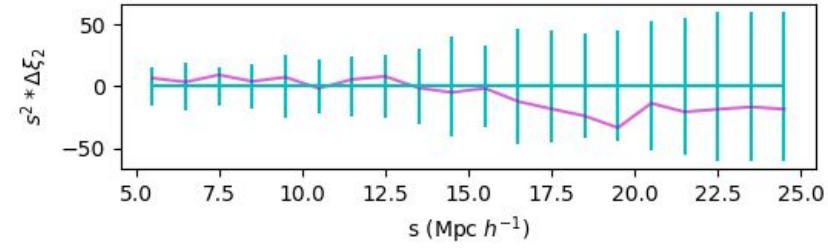
EPFL - LABORATOIRE D'ASTROPHYSIQUE

void 2PCF multipoles: Rv = [0,15] Mpc/h





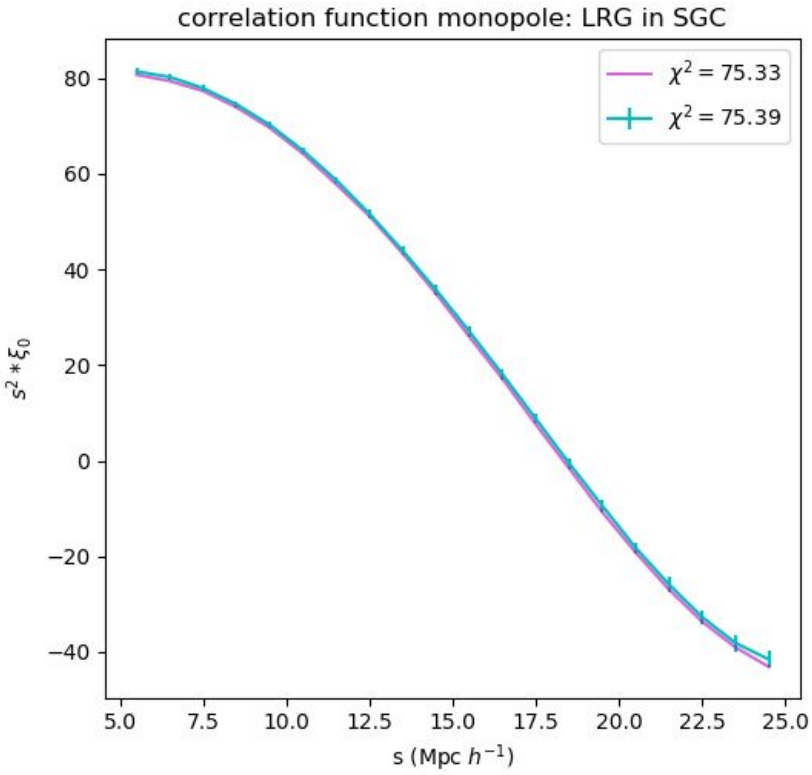


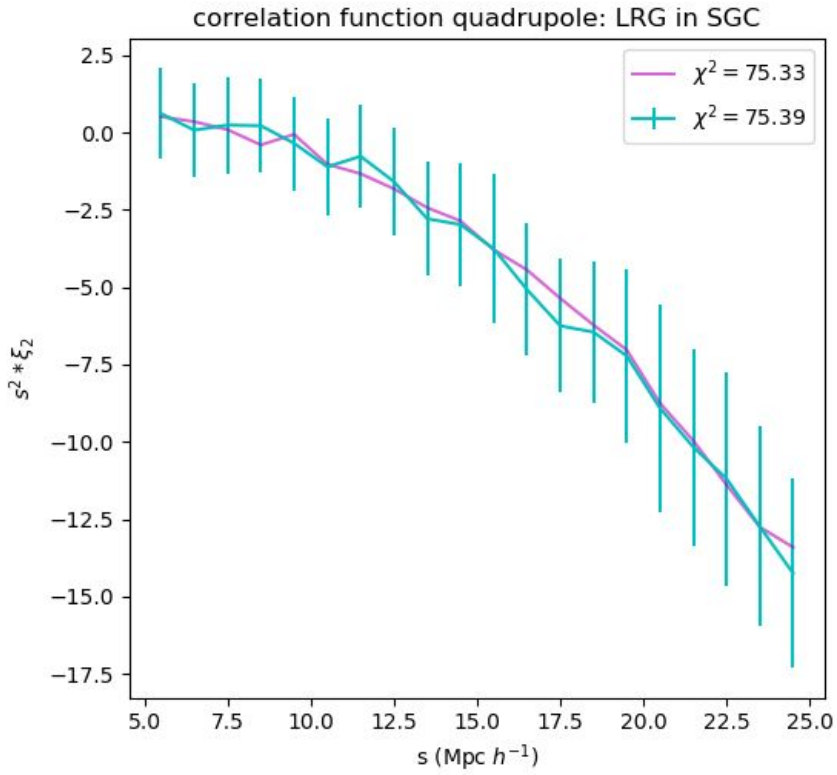


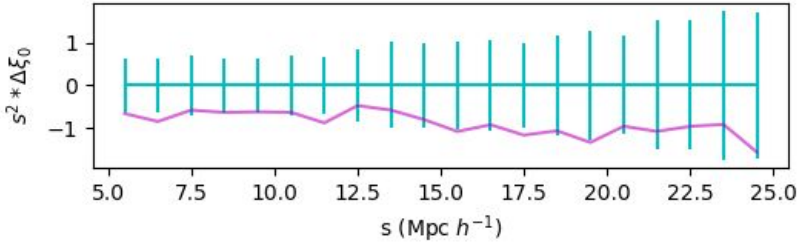
Reminder: Close-chi2 tests

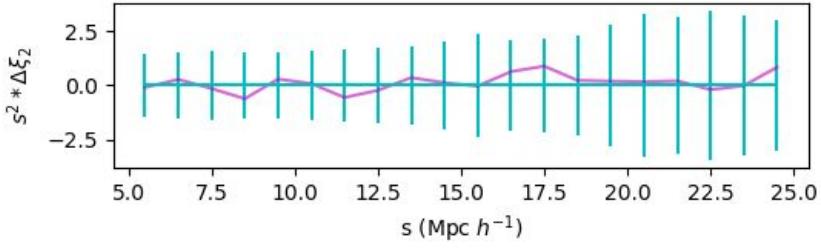
EPFL - LABORATOIRE D'ASTROPHYSIQUE

void 2PCF multipoles: Rv = [15,30] Mpc/h









Reminder: Close-chi2 tests

EPFL - LABORATOIRE D'ASTROPHYSIQUE

void 2PCF multipoles: Rv = [30,1000] Mpc/h