ZTF DR2 Paper status : SNIa & Clusters around voids

ZTF-IN2P3 @ LPNHE

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SNIa around voids - Aubert & al

Paper status : WIP

1. Introduction — Proofread & references

2. Data samples — Proofread & references
   1. ZTF Cosmo DR2
   2. SDSS DR7 Void & Galaxie sample
   3. Final data selection — Add missing plots

3. SNIe Ia around voids — Done
   1. Repartition
   2. SNe Ia properties

4. SNe Ia and Voronoi volume information — Add missing plots
   1. Repartition — Slight clarifications
   2. SNe Ia properties — Slight clarifications
   3. Significance

5. Discussion — Proofread & references
   1. SNe Ia subtypes and repartition — To write properly
   2. Stretch and environment : Comparison with Madeleine's and Florian's papers (see after)

6. Conclusion — Will be written at the end

SNIa & Void selections

Galaxy / Voids sample

SDSS-DR7 Main Sample (Blanton 2005)

SNIa sample

Volume-limited sample :

$z = [0.0018, 0.065]$, $M_r < -18.63$

$N_g = 86946$

$R_v > 10\ \mathrm{Mpc}\,.\,h^{-1}, N_v = 115$

Redshift-limited sample :

$z = [0.0018, 0.11]$

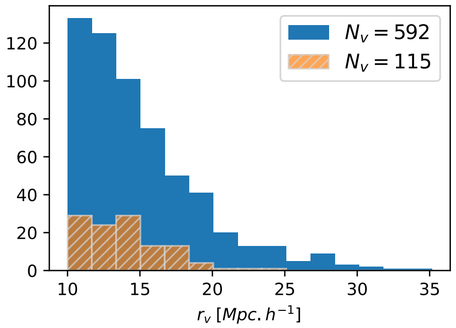
$N_g = 341433$

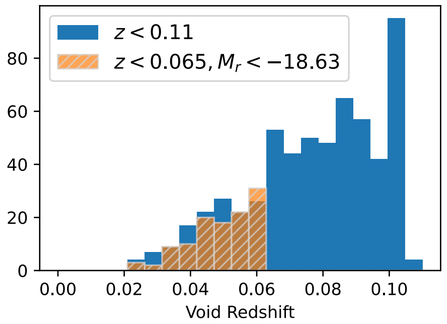
$R_v > 10\ \mathrm{Mpc}\,.\,h^{-1}, N_v = 592$

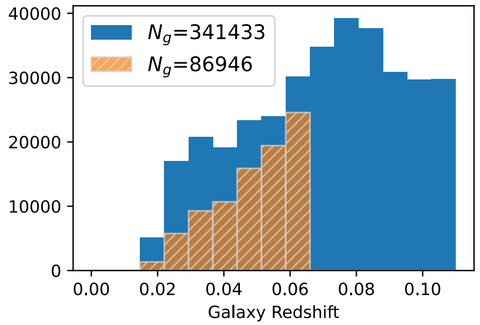
ZTF Cosmo-DR2 within SDSS-DR7 with $z \in [0.02, 0.1[$

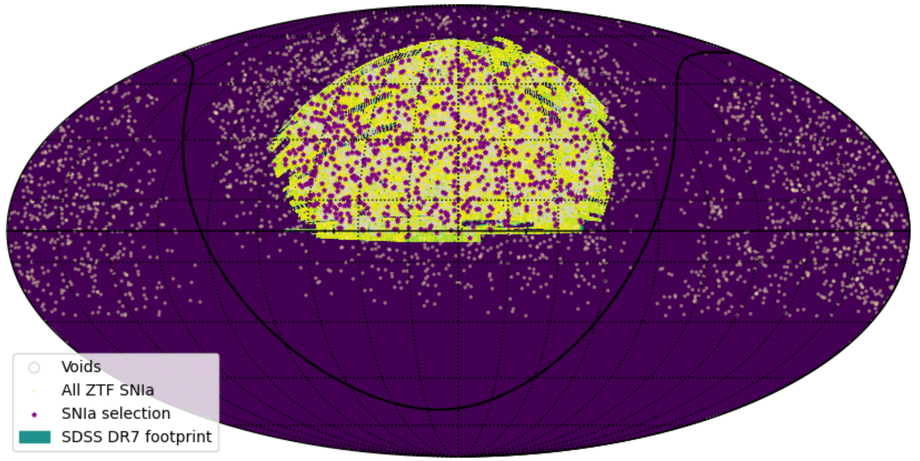
Volume-limited sample : $z \leq 0.06$, $N_{\mathrm{SNIa}} = 414$

Redshift-limited sample : $z \leq 0.1$, $N_{\mathrm{SNIa}} = 990$





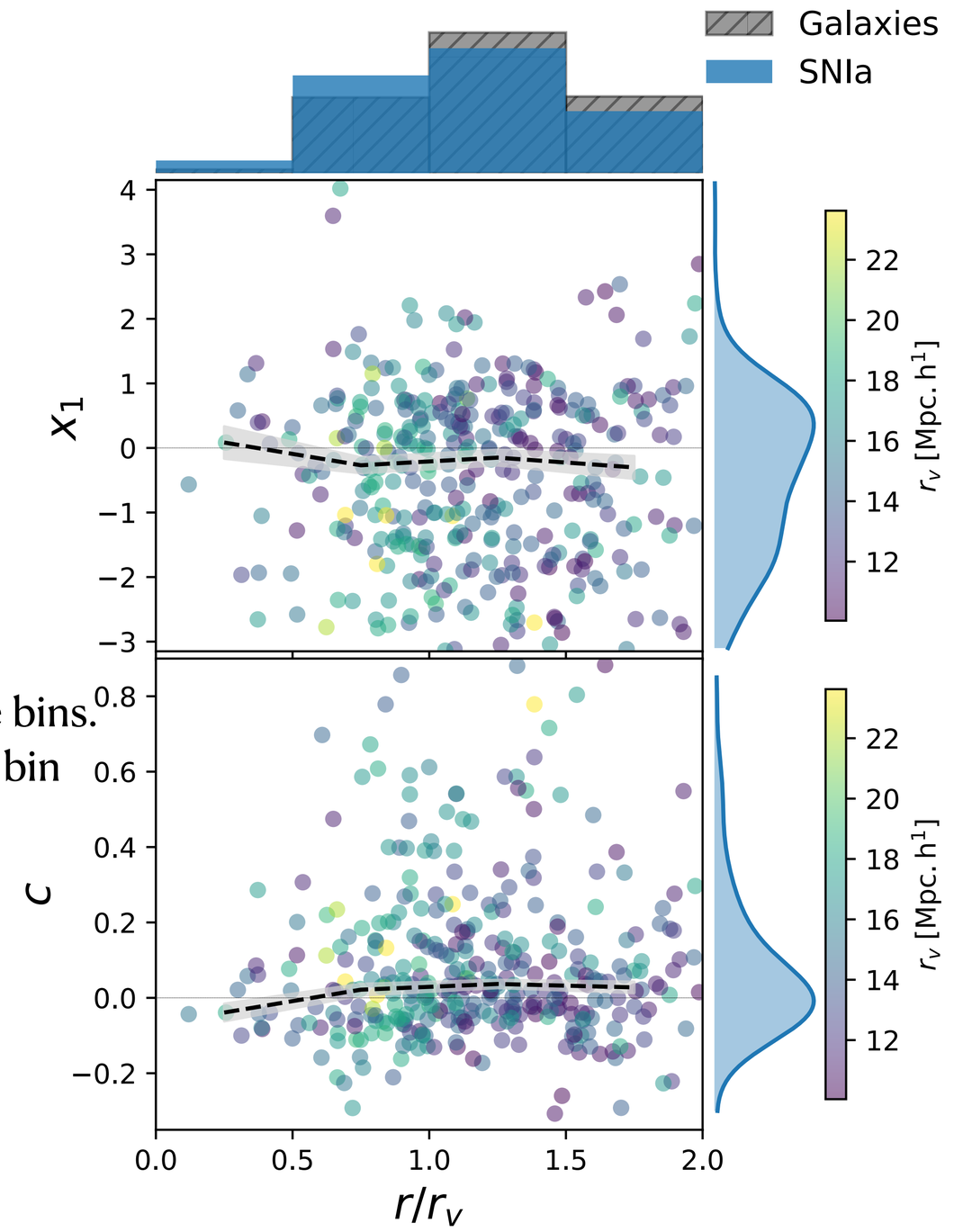




SNIa properties w.r.t voids

2 – 4 % order of magnitude of SNIa in voids

No significant dependency of the subtypes w.r.t void centric distance bins.
→ Although, majority of 91bg -like are out of the most underdense bin

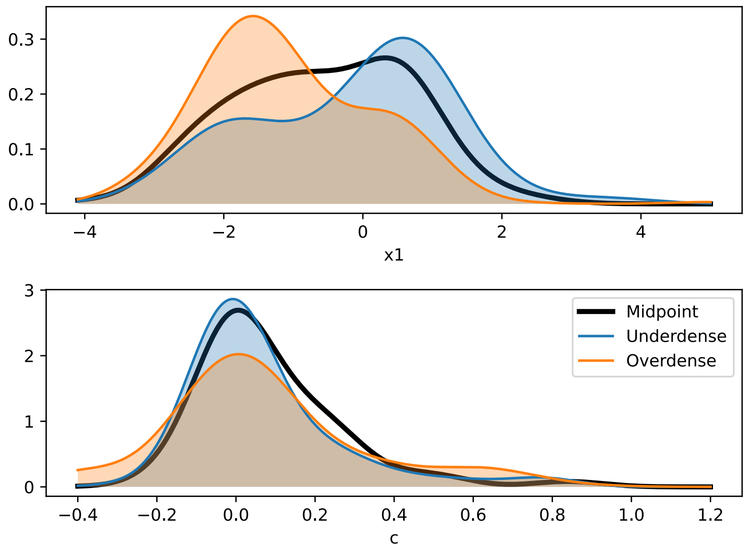


SNIa properties w.r.t voids

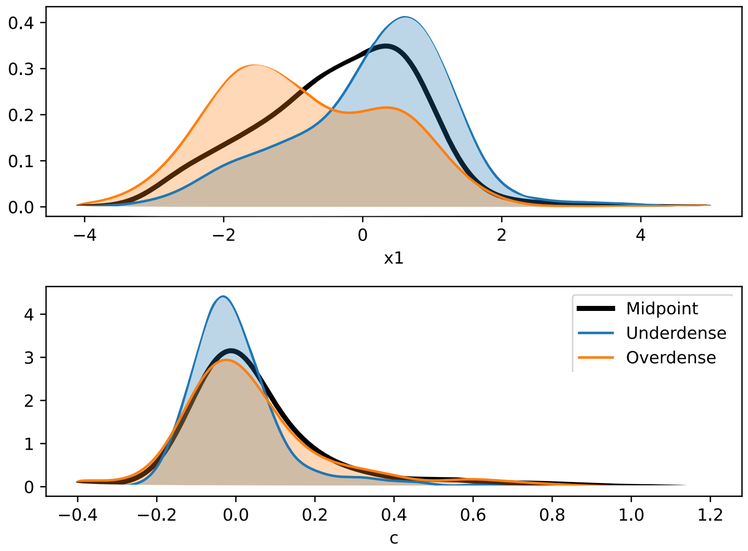
Stretch variation with volume
Colour (vollim) flat

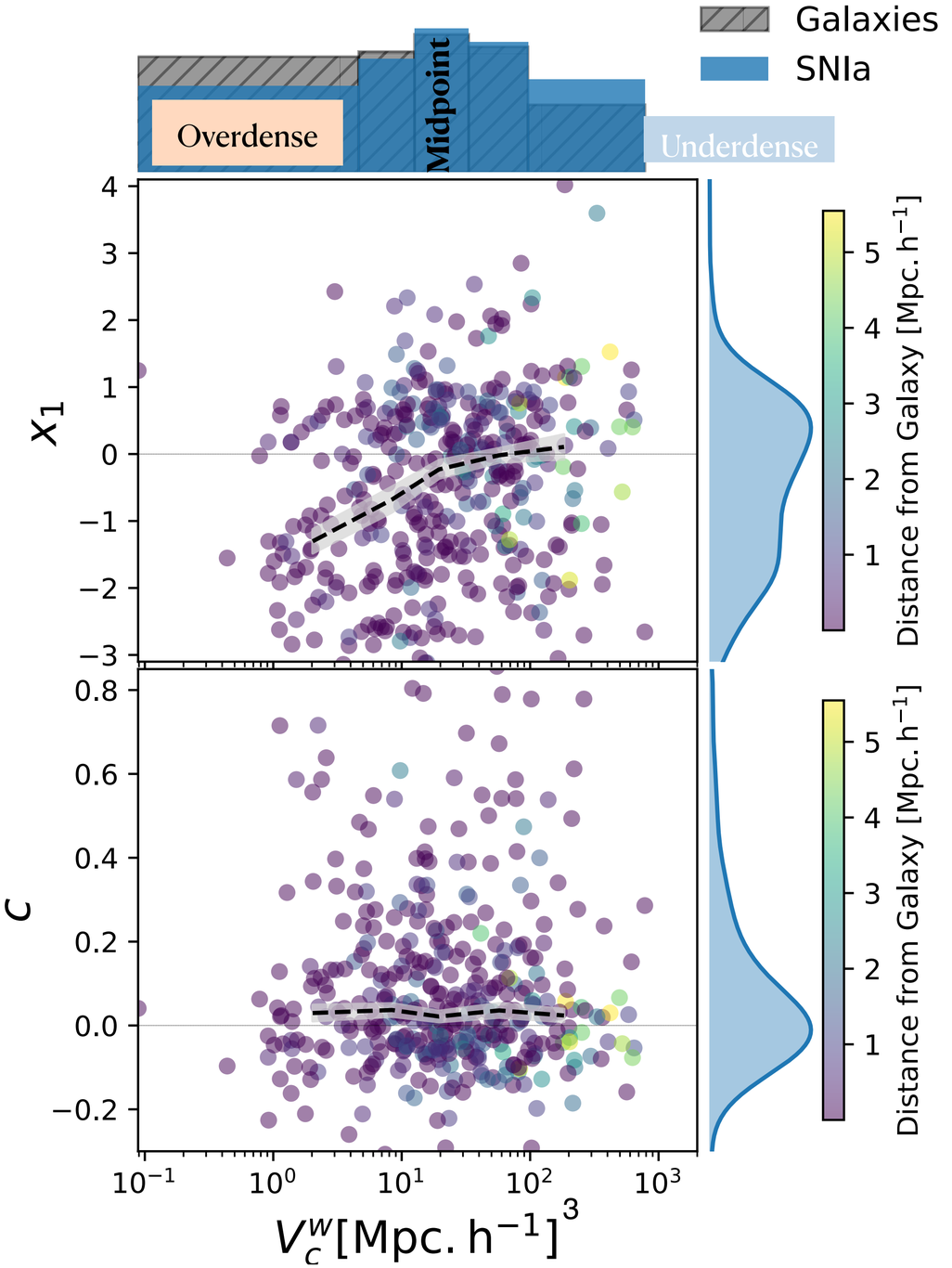
→ Altough, majority of 91bg -like are out of the most underdense bin

Volume-limited



Redshift-limited





SNIa around clusters - Ruppin & al

Paper status : Mostly done (Proofreading and plot updates)

1. Introduction

2. Supernovae and Cluster samples
   1. ZTF SN Ia sample
   2. Galaxy cluster catalogue
   3. Matching procedure

3. SNIe Ia property as a function of distance from their nearest clusters
   1. SNIa properties from cluster-host and field host-galaxies
   2. Effect of selection function

4. Modeling the environmental drift of SNIa stretch
   1. Steetch distribution
   2. Analysis procedure
   3. Significance

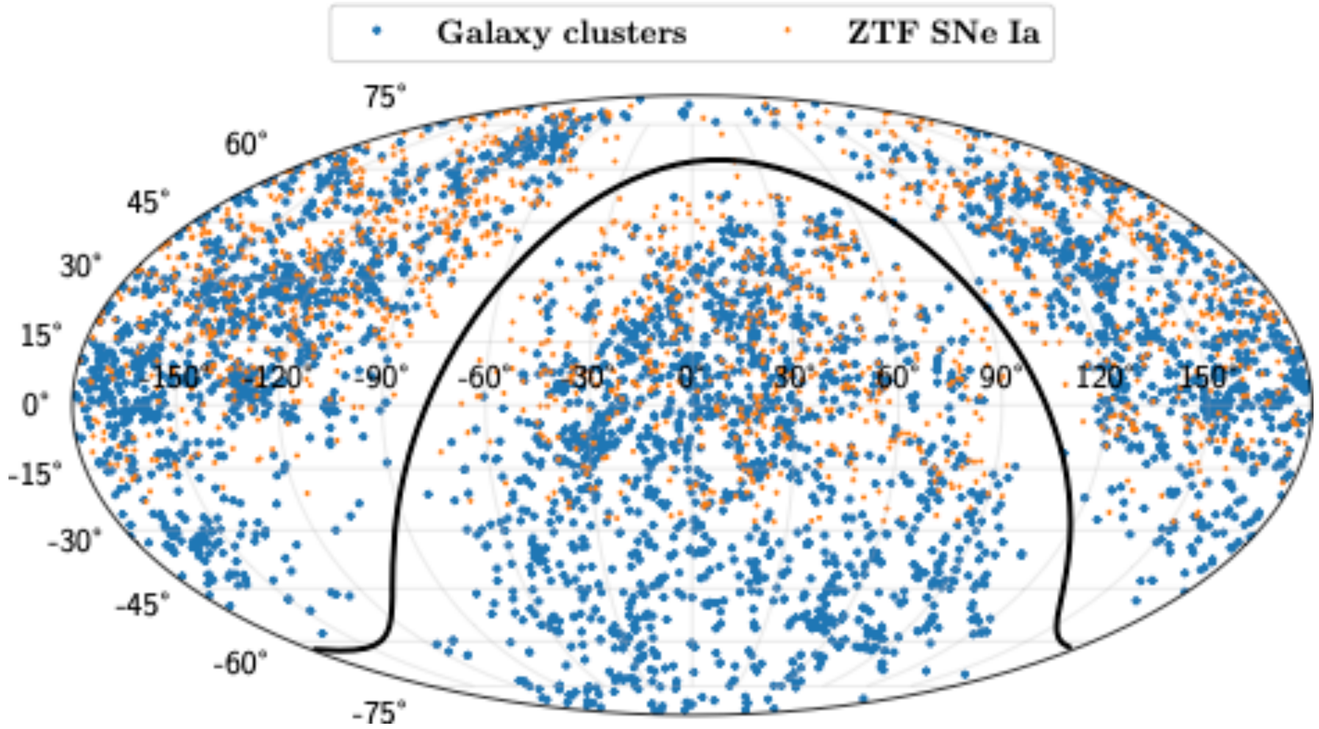
5. Results
   1. Best-fitt model and significance
   2. Protential selection effect
   3. Fraction of quenched galaxies

6./7 Discussion & Conclusions

SNIa & Cluster selection

Galaxy cluster sample

$N_c = 7913$
→ Multiple detection across various surveys/ catalogues (Pl-SZ2, MCXC, SPT, ACT, SDSS)



SNIa sample

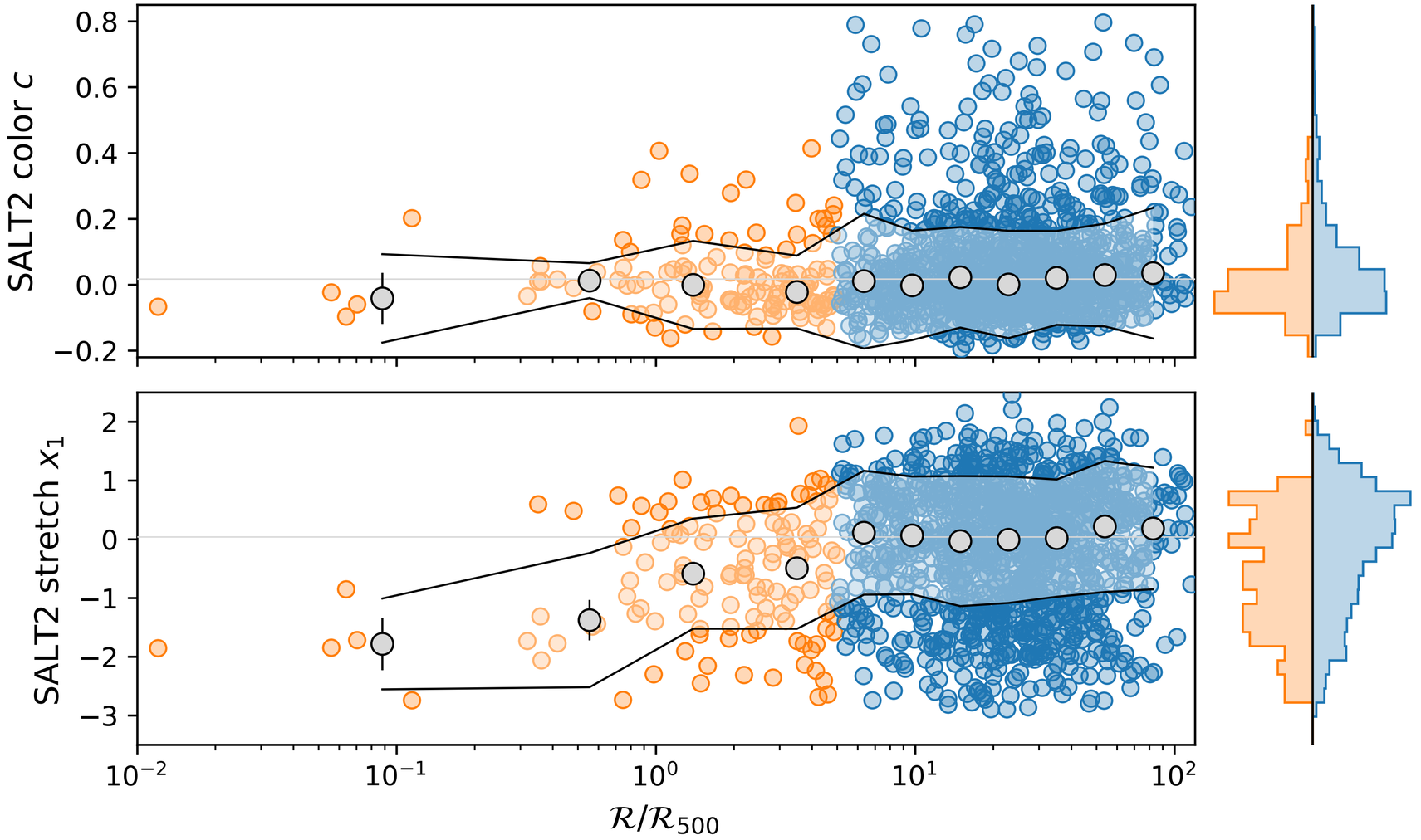
Properties cut :

$$c \in]-0.3, 0.3[$$
$$x_1 \in]-3, 3[$$

Good light curve sampling

$z \leq 0.1$, $N_{\mathrm{SNIa}} = 1467$

Cluster-centric SNIa properties distribution



→ Attempt to model ZTF stretch distribution accounting for cluster environmental drift **and** redshift drift from Nicolas & al 2021. Results in accordance to Ginolin & al 2024-a (in prep)

SNIa X LSS : Take home messages

Stretch varies according to environment.

Effect is obvious and more significant in overdense, cluster environment.

Less obvious for low environment, tbd whether lack of influence or lack of ‘definition’ / stat
→ Waiting for DESI

Colour varies according to environment?

Colour unclear. There might or might not be an influence. Hard to disentangle from selection effects.

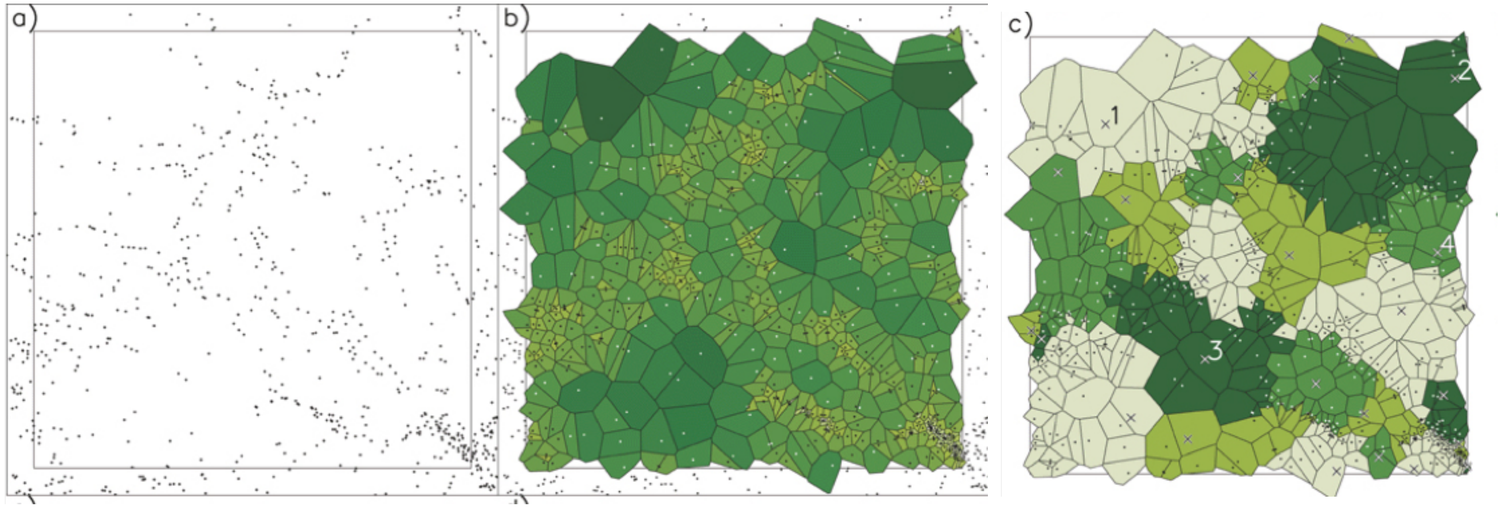
The cool thing

General agreement between voronoi volumes results and cluster analysis.

Unclear if it is a consequence of the mass-stretch or not, hints toward the not.

Supplement void analysis plot

Revolver/Zobov voidfinder → Voronoi tesselation based algorithm



Tracer distribution | Voronoi tesselation | Watershed transform

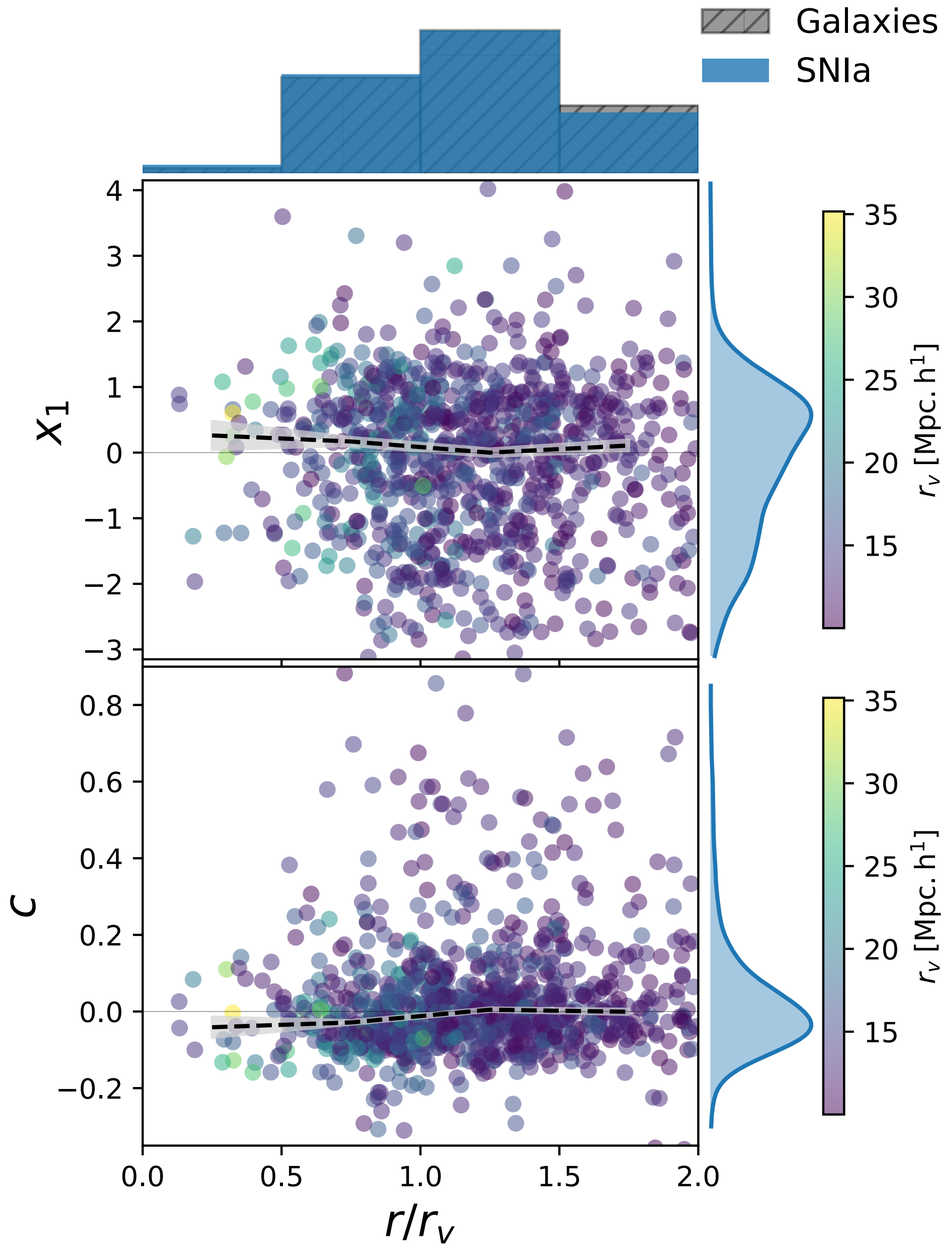
Neyrinck 2008

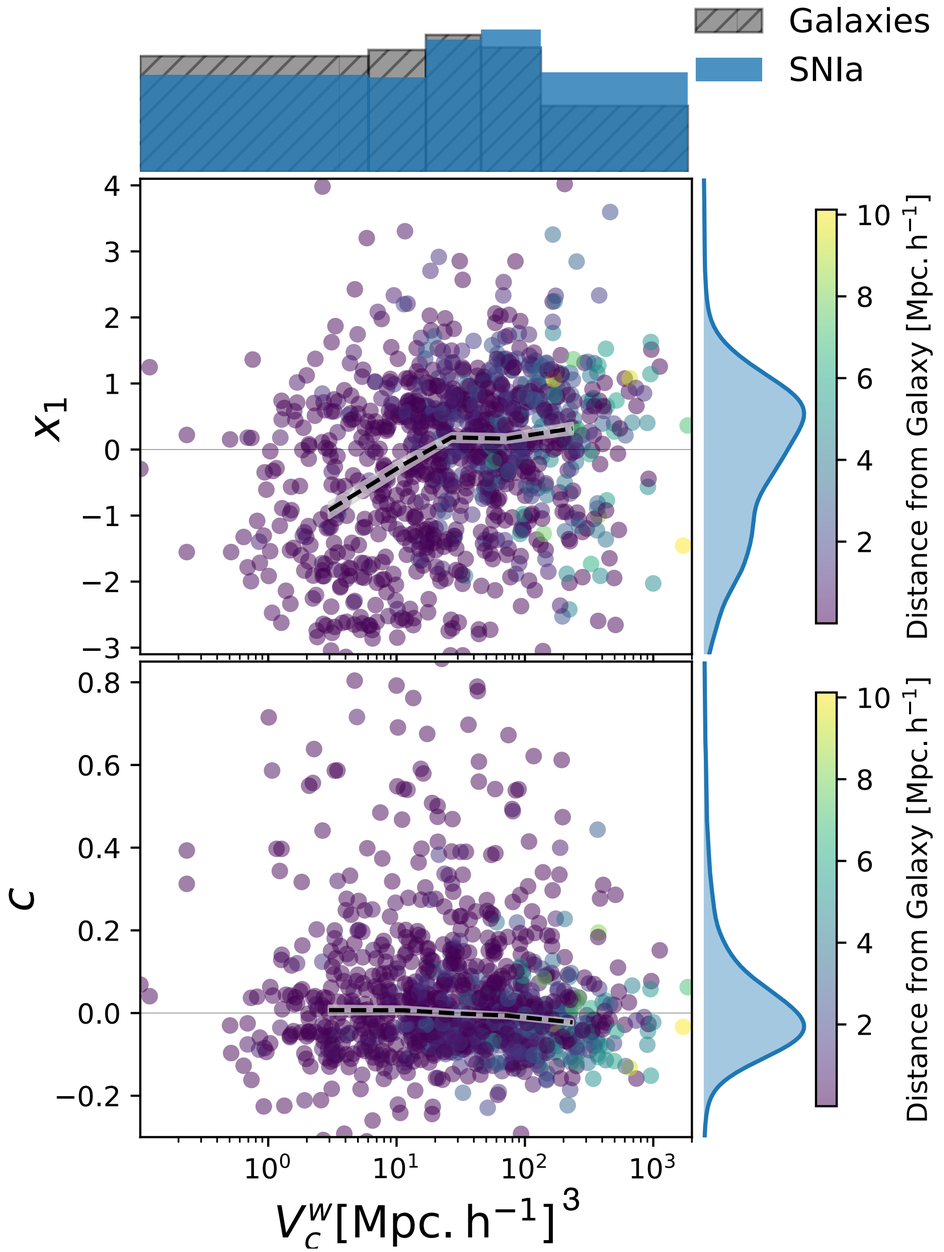
Local volume around galaxies. V

Void centre $X_v = \frac{\sum_i V_i X_i^g}{\sum_i V_i}$

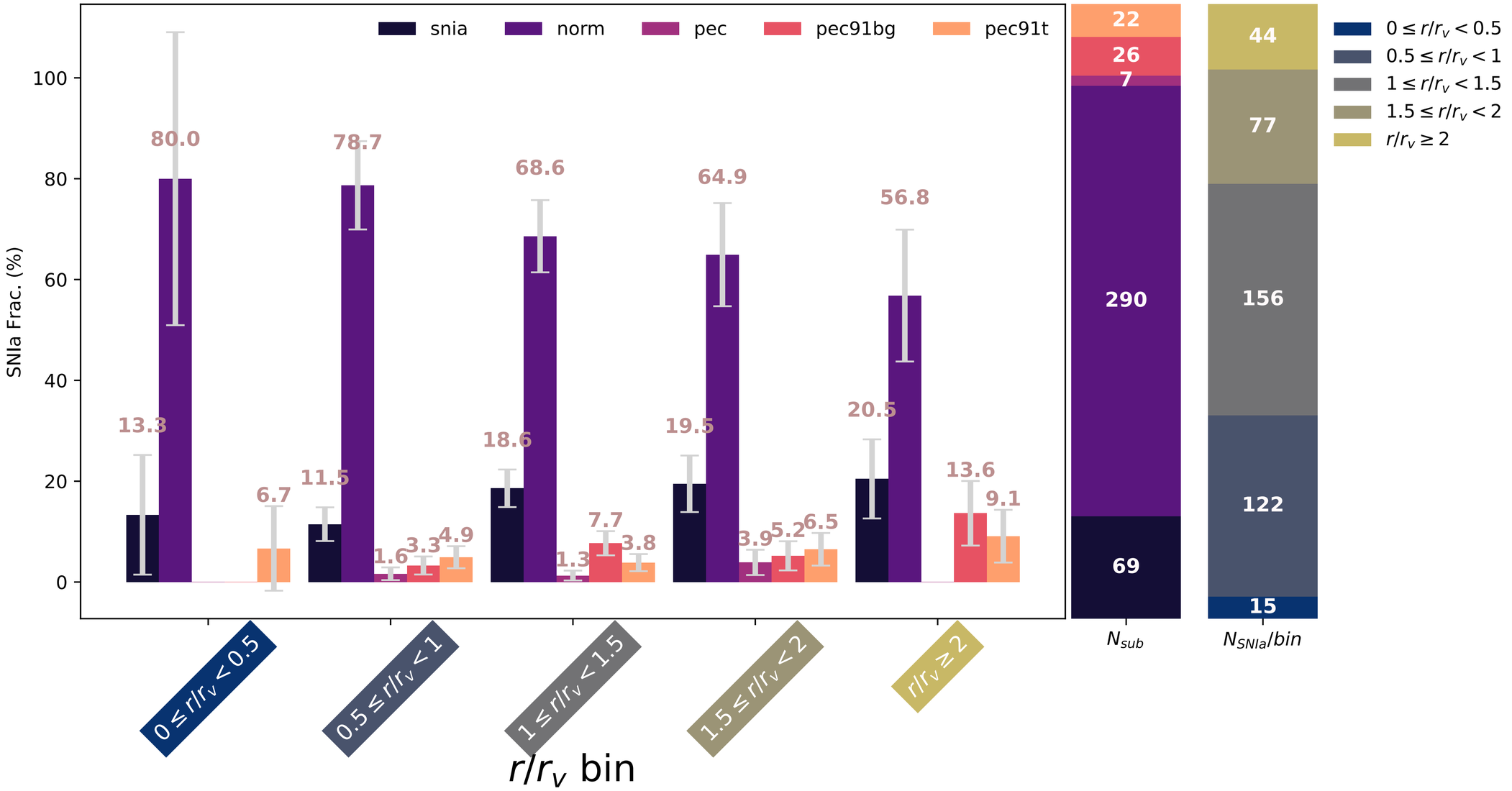
Radius $R_v = \left(\frac{3}{4\pi} \sum_i V_i \right)^{1/3}$

Supplement - VoidFinding

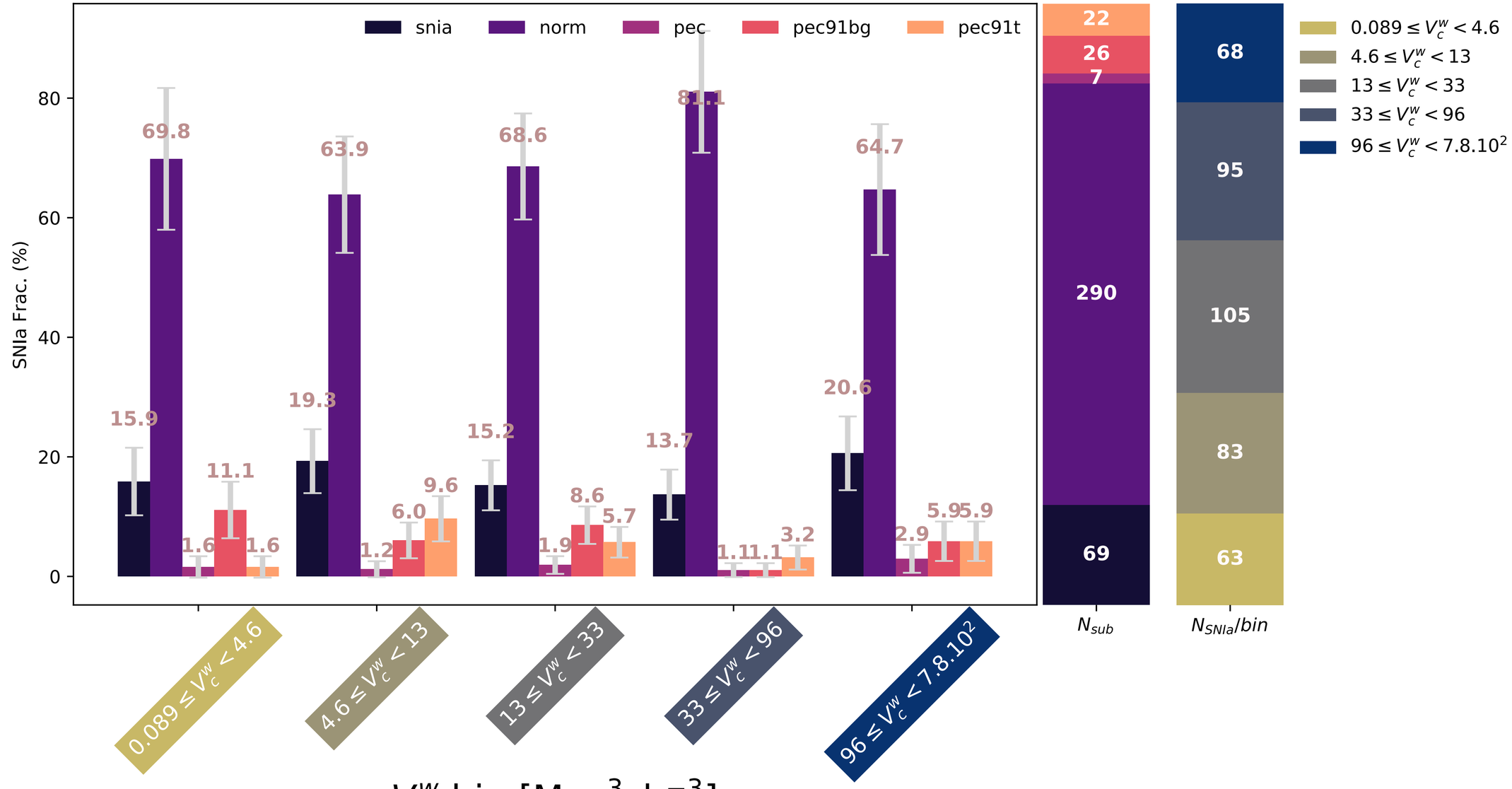




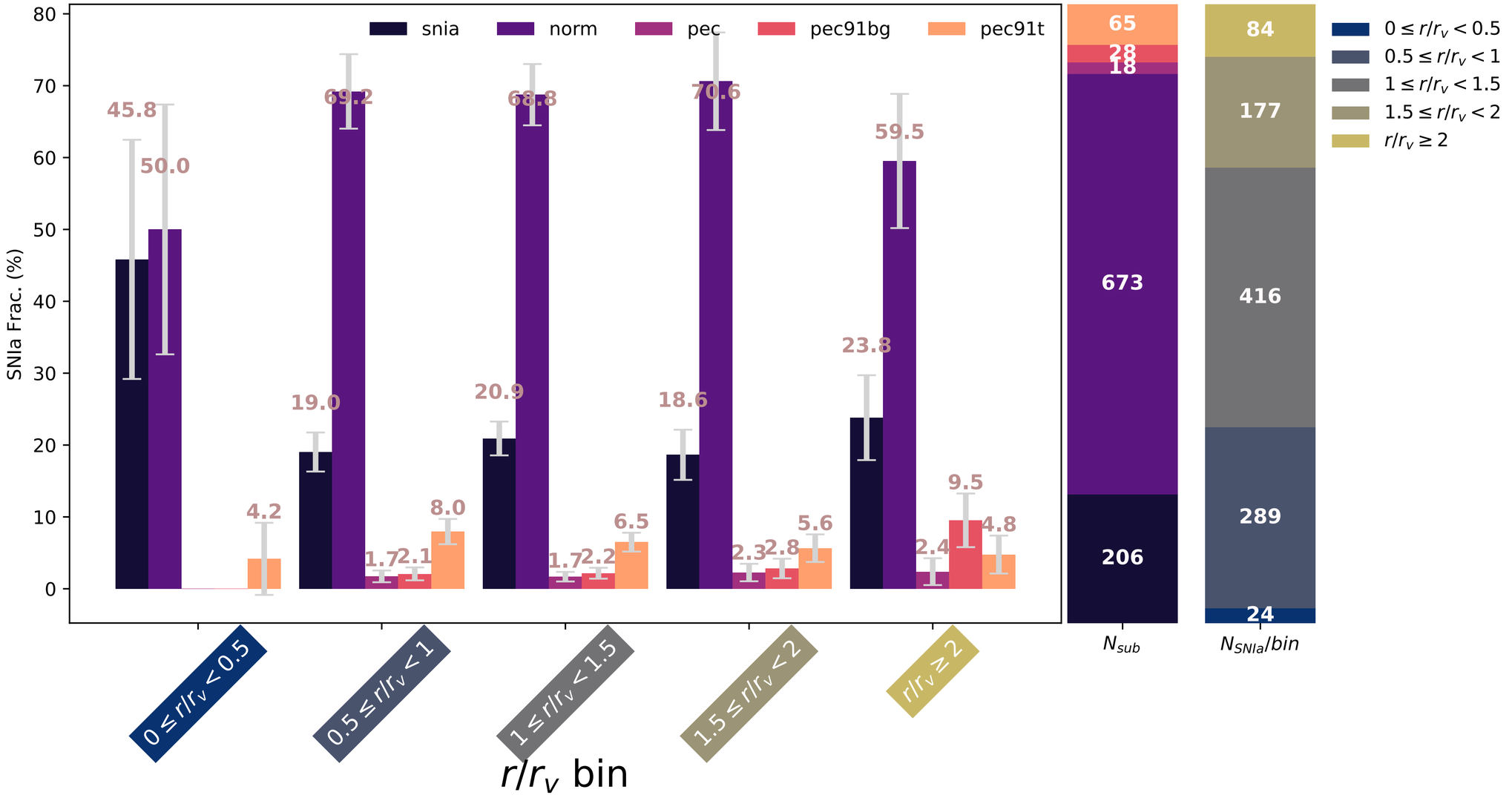
Supplement - Redshift limited scatter plots



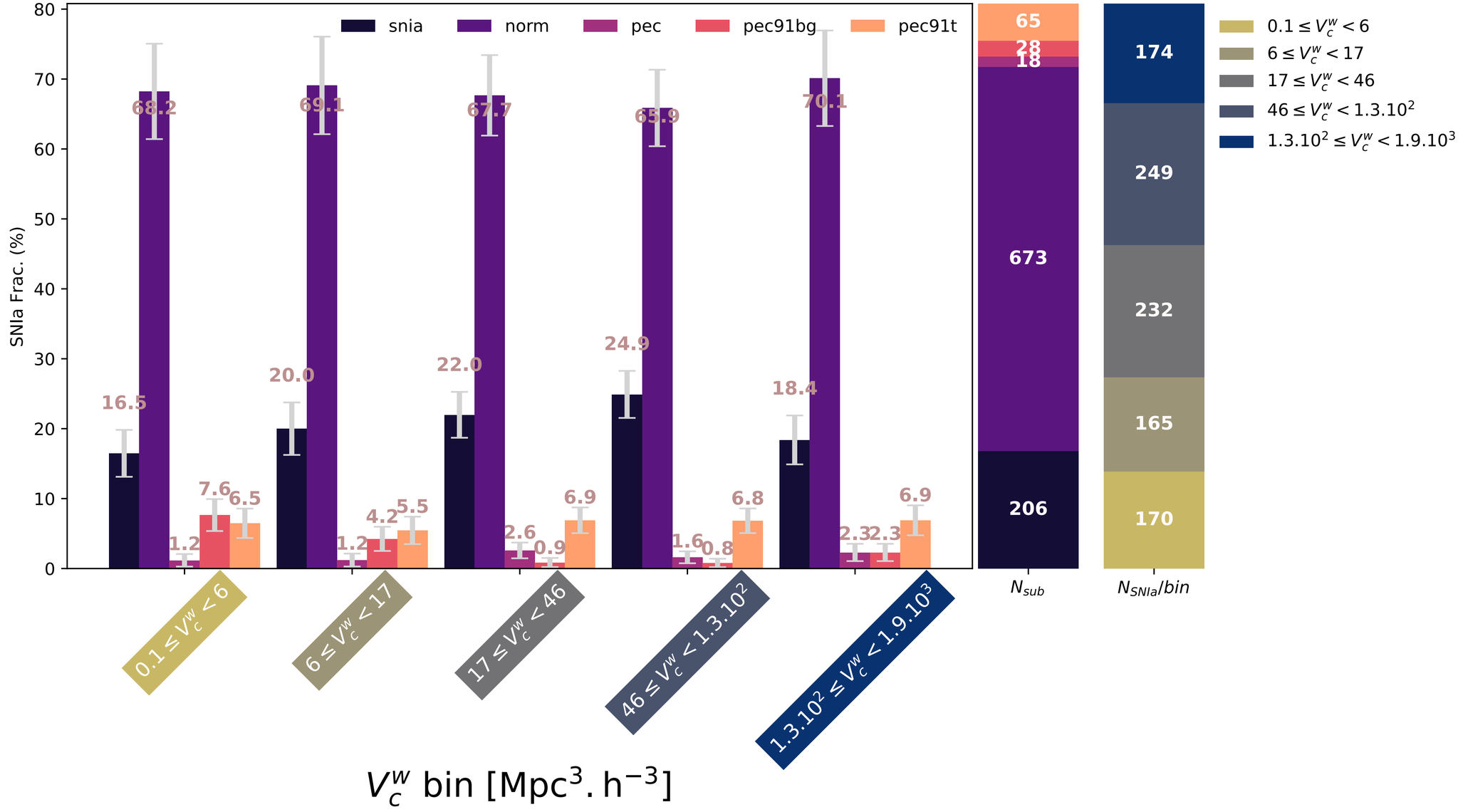
Supplement - SNIa subtypes repetition (vollim)



Supplement - SNIa subtypes repetition - volumes (vollim)



Supplement - SNIa subtypes repetition (redlim)



Supplement - SNIa subtypes repetition - volumes (redlim)