SSG 2025

Horizon Run 5: Collaboration and Upcoming Data Release

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with

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HR5 universe

- Horizon Run 5 (HR5, Lee & Shin+21)

  - Hydrodynamical cosmological simulation covering a cubic volume of ~1cGpc^3 with a spatial resolution down to Δx=1kpc

    - L_{box}=1cGpc : Box size to sufficiently reproduce the BAO signatures and various large scale structures

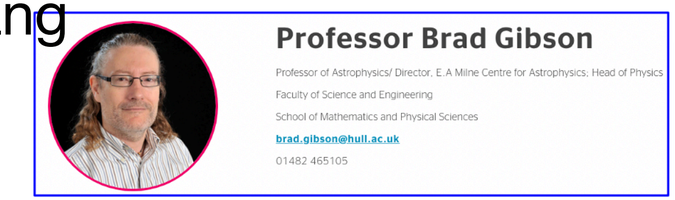
    - Δx=1kpc : Marginal resolution to form galaxies of $M_\star > 10^9 M_\odot$

First HD simulation of the HR series

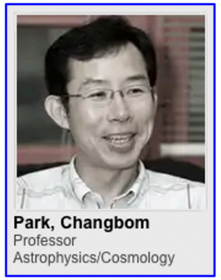
Horizon Run series

	HR1	HR2	HR3	HR4	HR5
Box size (L)	9417 cMpc	10285 cMpc	15450 cMpc	4436 cMpc	1049 cMpc
# of particles	4120^3	6000^3	7200^3	6300^3	gas cells+particles
Reference	Kim et al. (2008)	Kim et al. (2011)	Kim et al. (2011)	Kim et al. (2015)	Lee & Shin et al. (2021)
Code	GOTPM (Dubinski, Kim, Park 2004)	GOTPM	GOTPM	GOTPM	RAMSES (Teyssier 2002)

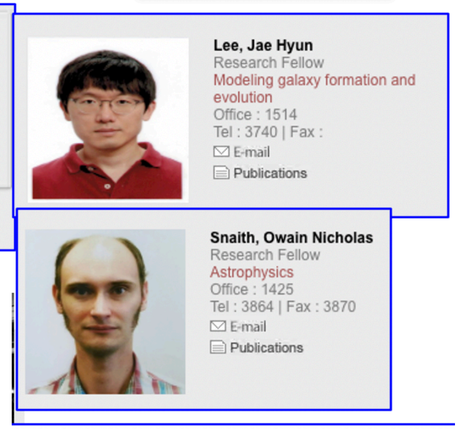
- HR5 Builders and Collaborators
  - KIAS (2): Changbom Park (PI), Juhan Kim
  - KASI (3): Jaehyun Lee, Jihye Shin, and Sungwook E. Hong
  - KISTI (2): Oh-Kyoung Kwon & Yonghwi Kim
  - Hull (3): Brad K. Gibson, C. Gareth Few, Leah M. Cox
  - IAP (2): Christophe Pichon & Yohan Dubois
  - Exeter (1): Owain N. Snaith
  - SNU (1): Ho Seong Hwang

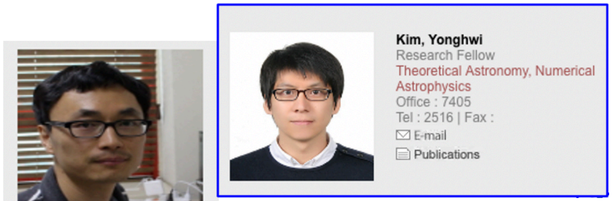










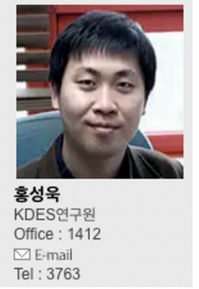












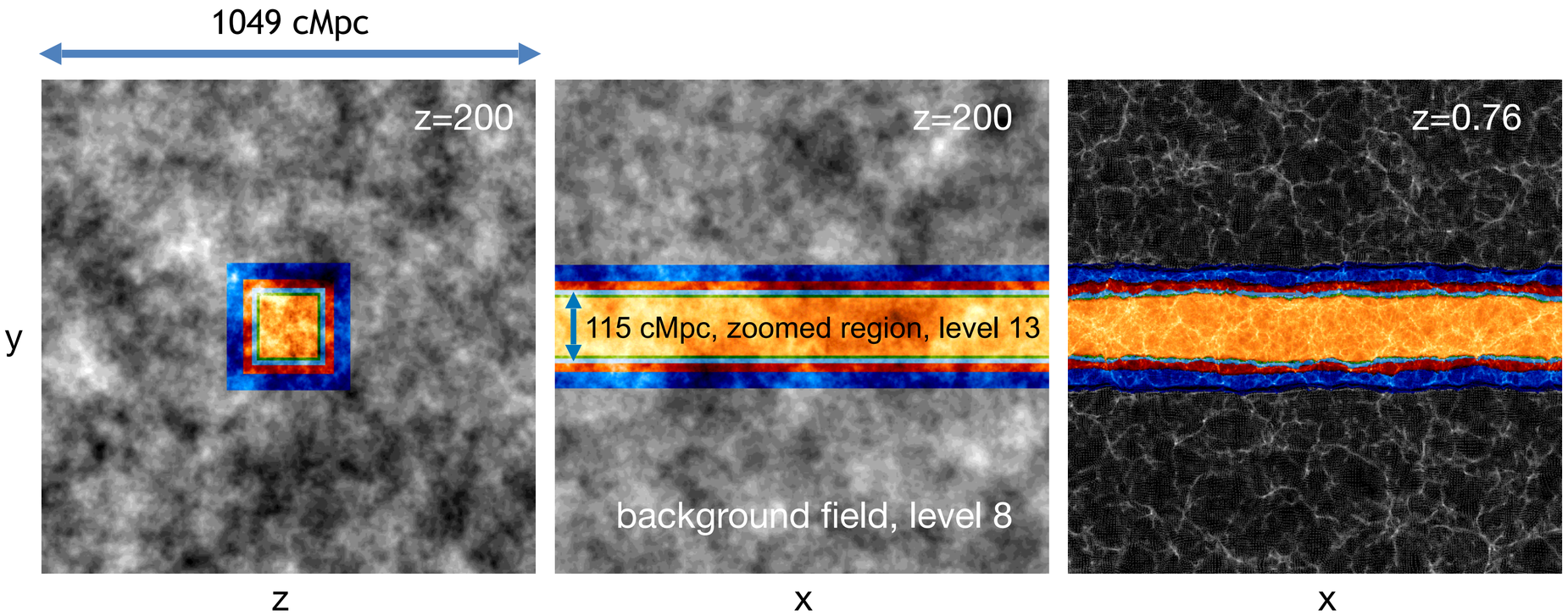
- Simulation outline
  - Code: **RAMSES** (Teyssier02, Dubois+14) based on the Adaptive Mesh Refinement scheme
    - Optimized for Nurion (**MPI+OMP hybrid parallelization**) by KIAS+KISTI
  - Reionization, gas cooling, star formation, chemical enrichment, SN & AGN feedback included
  - Simulation box
    - Volume - $(1049\ \mathrm{cMpc})^3$
    - **Zoomed region - $1049\times115\times115\ \mathrm{cMpc}^3$ (~1/80 of the box)**
    - Resolution - **up to 1kpc in the zoomed region**
  - Cosmology - h: 0.684, Ω_m=0.3, Ω_Λ=0.7
  - **Finished at z=0.625 (age~7.7Gyr)**
  - **600M cpu hours used**

- Initial condition

  - Linear power spectrum : calculated using the CAMB package (Lews+00)

  - IC : generated using MUSIC (Hahn & Abel+11) based on the 2nd-order Lagrangian perturbation theory (2LPT, Scoccimarro+98, L'Huillier+14)

  - **Zoomed region : long cuboid geometry for constructing light cone space data**



- HR5 Output
  - Total of ~1 PB data produced
    - Snapshots
    - Light cone space data from two observers looking in opposite directions based on the far-field approximation
    - 5 Cluster-forming regions with fine time steps

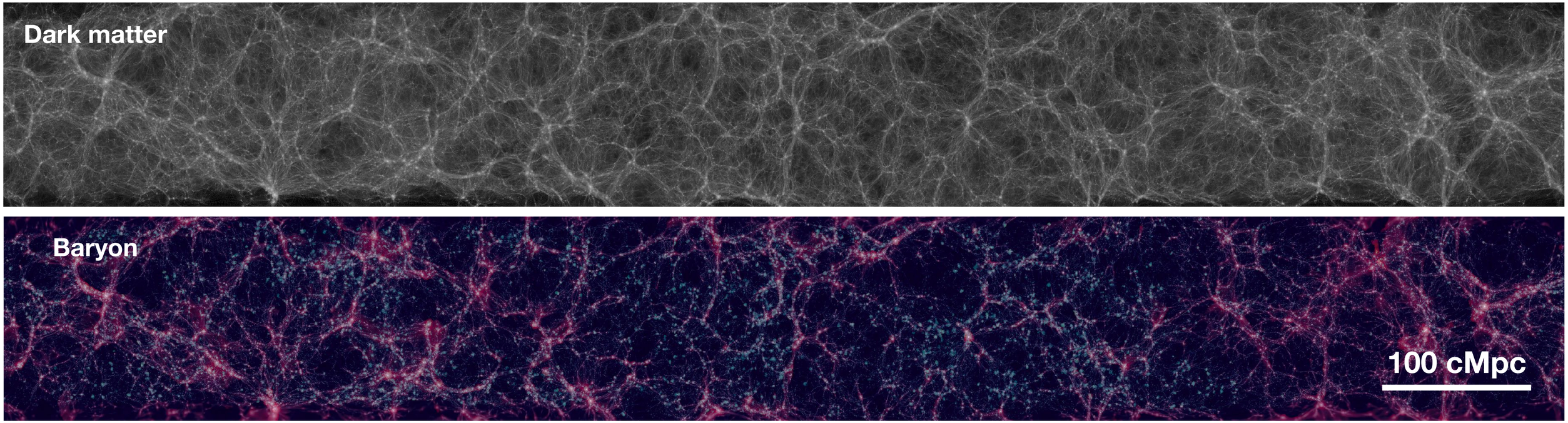
      ✓ Cluster candidates (Log $M_{200}/M_{\odot}$~14.7-15 at z=0) selected using a low resolution simulation

- Post-processing
  - Halo and galaxy finding: PSB-based Galaxy Finder (PGalF, Kim+2023)
  - Merger trees generated using stellar particles for galaxies (**ySAMtm**, Lee+14) and halos having no galaxies using DM particles (**Most bound particle scheme**, Hong+16)

- 146 snapshots dumped at z~200-0.625

  - Data type: AMR structure, hydro (gas), particle (DM+star), SMBH, and gravity

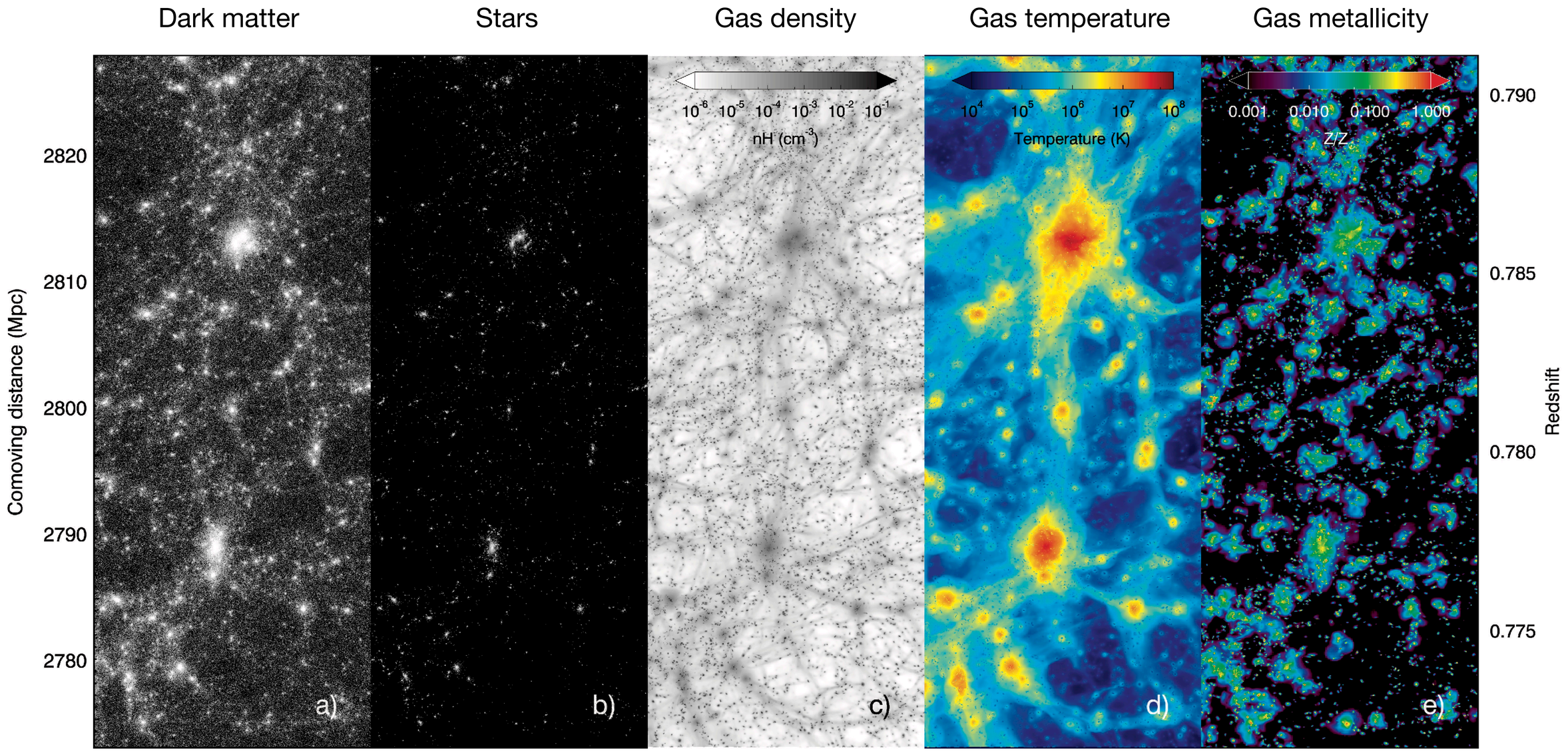
z~0.625

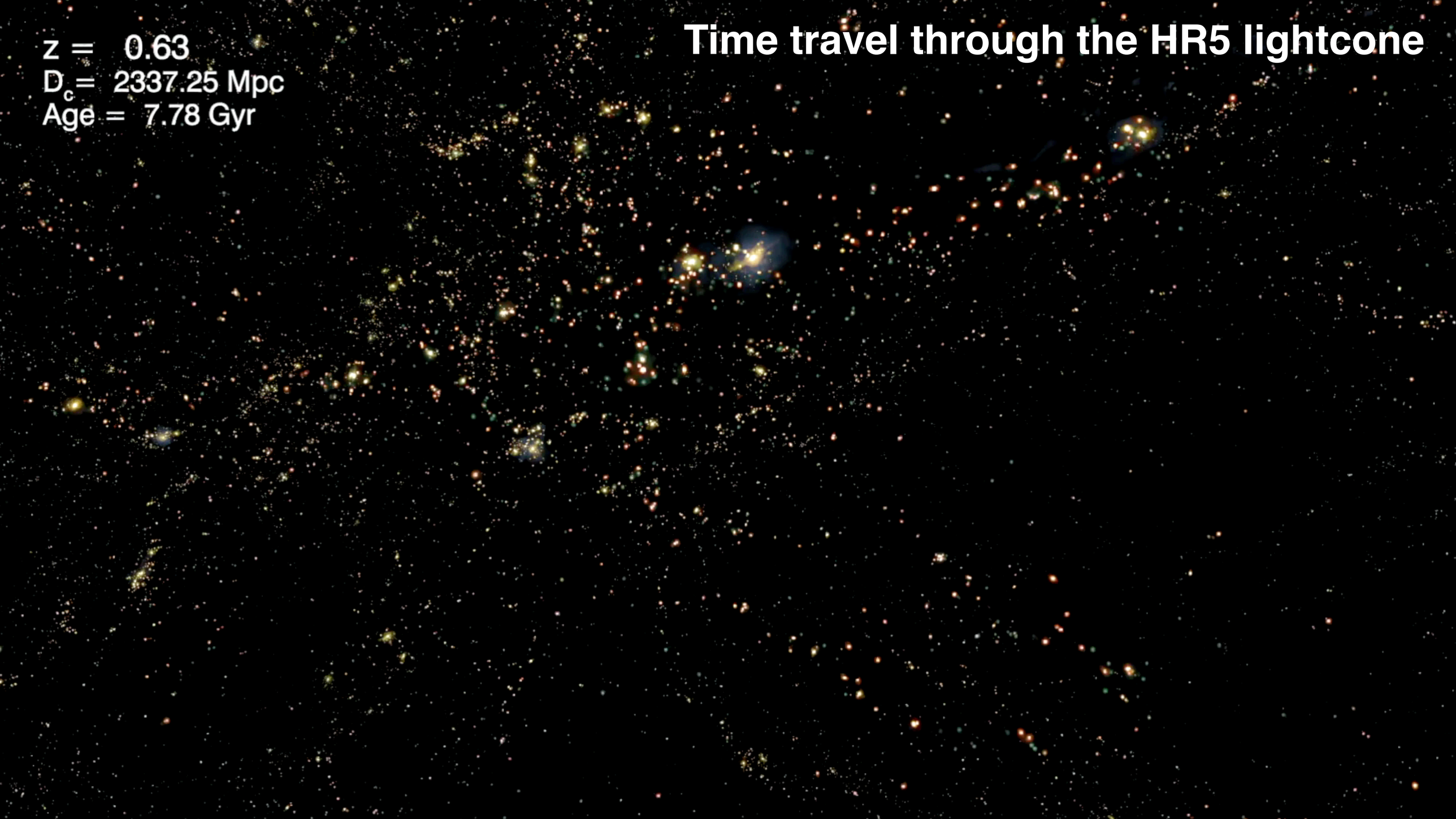


A slab of the zoomed region (thickness = 20 cMpc)

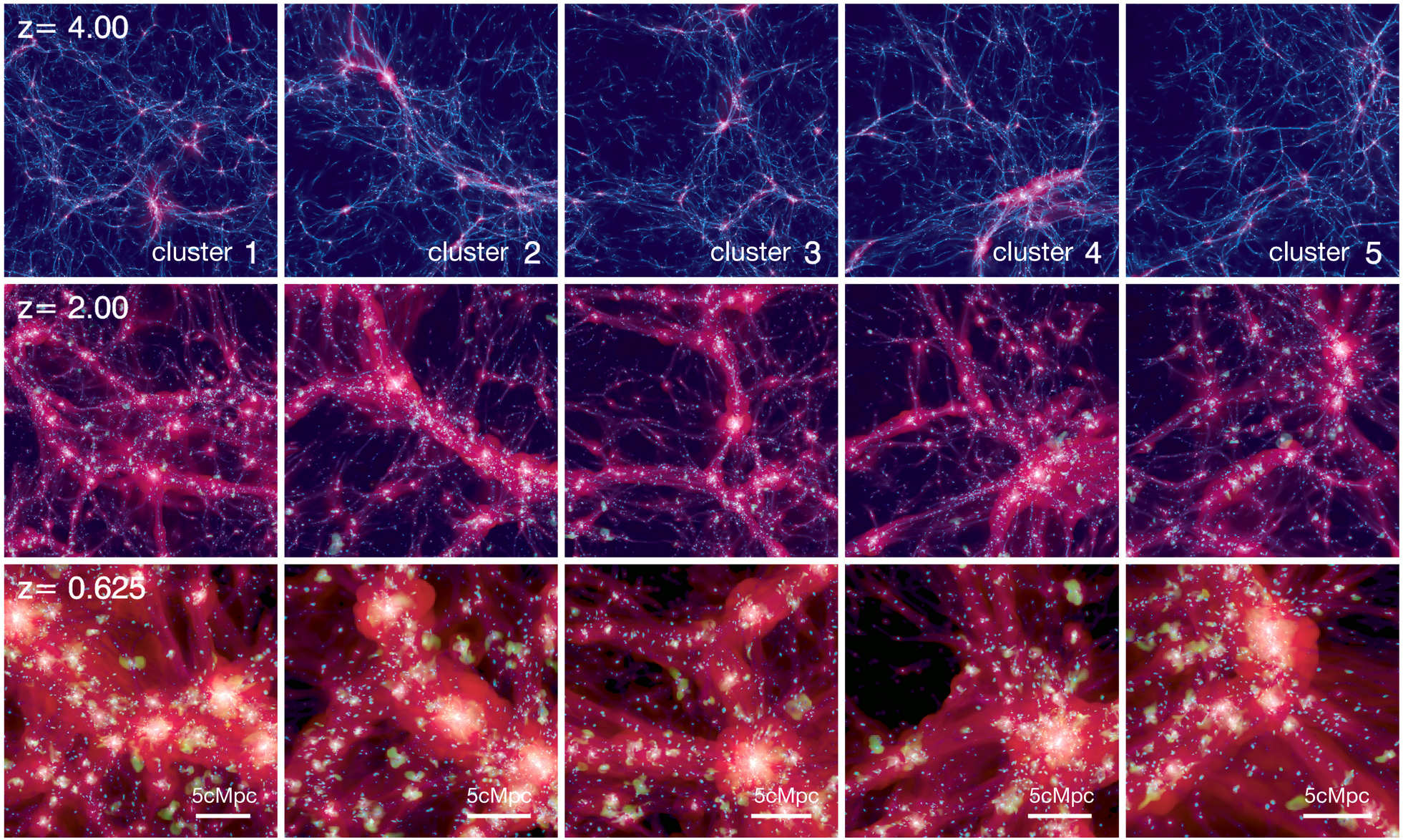
Red: temperature
Blue: gas density
Green: metallicity
Grey: stellar mass

- Light cone space data
  - Constructed on-the-fly based on a far-field approximation




z = 0.63
D_c = 2337.25 Mpc
Age = 7.78 Gyr
Time travel through the HR5 lightcone

- 5 cluster-forming regions with time steps finer than snapshots

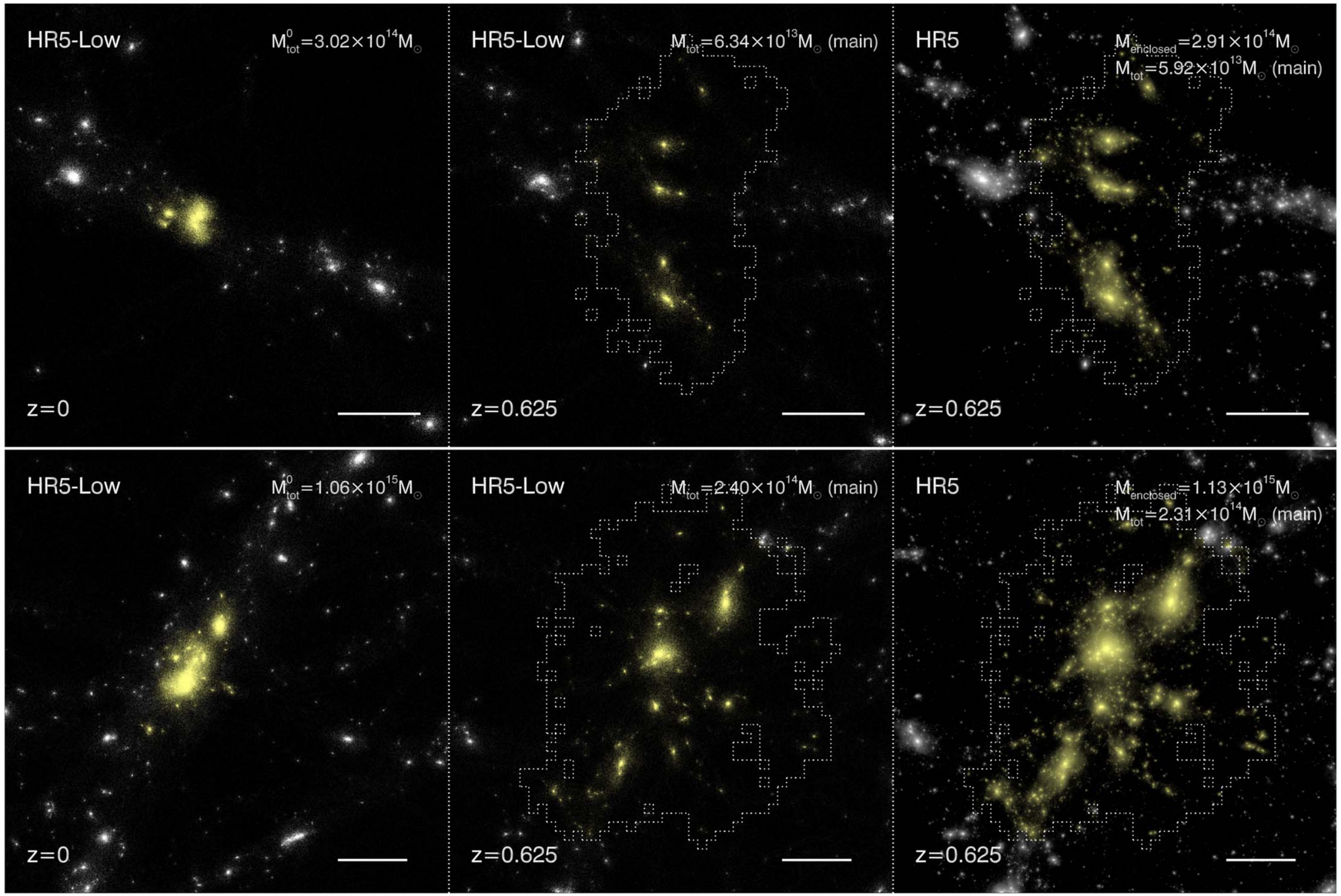


z= 180.40

Formation of a cluster in HR5

3 cMpc

- Cluster candidates
  - 189 clusters identified using a low resolution simulation (HR5-Low)



- Galaxy catalogue - Reduced properties of galaxies

Gala

POS
VEL
STAR
GAS
M_SMBH
M_DM
ID_HAL
ID_SUB

M
M_TOT
SFR
Z
Z_R_EF
R_EFF
IDX_CO
COMPAC
V_ROT
V_SIGM
AGE_MW
AGE_LW
LUMINO
L

M
M_TOT
M_COLD
Z
Z_R_EF
R_EFF
V_ROT
V_SIGM
L

jaehyun — jaehyun@grammar:~/HR5/psb/catalogue/sn296 — ssh -p 7777 gate.kias.re.kr -Y — 152×54

a= 0.615248018 H0= 68.4 km/s/Mpc L=1048.58044 cMpc Pure volume= 1.28216523e+07 cMpc^3

ID	Host Halo ID	Host Mtot (Msun)	Host M200c (Msun)	x (cMpc)	y (cMpc)	z (cMpc)	Vx (km/s)	Vy (km/s)	Vz (km/s)	Mstar (Msun)	Mstar
0000001	0000001	1.70764954e+11	1.64814319e+11	0.496642	523.426981	499.328731	-122.2465	280.5959	492.1455	1.94236506e+09	1.854
0000125	0000125	1.18066079e+11	9.38622250e+10	0.560306	568.757434	489.474576	-281.3835	-236.3815	279.2067	1.61630032e+08	1.616
0000138	0000138	2.03272829e+10	1.77859100e+10	0.549241	498.313714	461.513149	89.2224	174.8316	11.8816	4.50964040e+07	4.509
0000146	0000146	1.10562405e+11	1.07301864e+11	0.423635	571.067120	503.293915	-305.9453	-274.2605	298.0024	7.36023232e+08	7.360
0000206	0000206	4.07818413e+10	3.72296849e+10	0.510454	507.249088	480.397246	183.3649	160.2928	368.4702	6.04361760e+07	6.043
0000254	0000254	6.40388807e+10	6.00058008e+10	0.402077	506.640723	488.954930	175.4747	247.5485	513.5426	4.20626400e+07	4.206
0000256	0000256	3.26173754e+10	2.92149750e+10	0.583891	513.745718	460.113208	50.9240	288.3644	-67.0210	2.39535580e+07	2.395
0000270	0000270	9.59258771e+10	9.02636029e+10	0.600160	567.483145	494.577039	-251.9156	-136.3503	221.9026	1.26942502e+09	1.259
0000364	0000364	4.34345646e+10	4.09344256e+10	0.545643	571.321004	539.094472	35.3676	-244.2390	513.1630	7.57855600e+07	7.578
0000391	0000391	8.32225986e+10	8.02218707e+10	0.613480	496.332867	490.675258	140.9041	537.4230	451.7823	5.38774464e+08	5.387
0000483	0000483	3.53244640e+10	3.24304844e+10	0.537104	566.990033	542.362492	11.7495	-104.7915	401.7963	3.61640320e+07	3.616
0000616	0000616	3.56338852e+10	3.31554019e+10	0.499243	460.878747	545.315033	-373.4143	-149.0792	-7.8976	6.64053400e+07	6.640
0000631	0000631	3.83156088e+10	3.57814469e+10	0.451701	463.555134	538.107260	-655.1259	-288.2293	207.8787	2.19501280e+07	2.195
0000634	0000634	7.98128939e+10	7.34881993e+10	0.469671	571.536012	571.377784	291.5259	-127.9868	273.5236	6.08321600e+08	6.083
0000689	0000689	1.20720818e+11	1.11580917e+11	0.448048	541.385850	567.353792	138.4239	122.8898	328.1794	8.92433408e+08	8.924
0000690	0000690	7.08278595e+10	6.61670556e+10	0.554598	550.487362	584.717340	78.0034	-117.1486	664.9460	9.90753600e+08	9.833
0000691	0000691	7.26517890e+10	6.82573316e+10	0.433020	562.830411	526.768116	360.4008	99.6521	496.2659	7.76079104e+08	7.689
0000692	0000692	1.11831368e+11	9.79669197e+10	0.491457	575.417121	577.118788	115.5852	-238.0931	267.4913	1.17222157e+09	1.148
0000693	0000693	5.62100013e+10	5.25185174e+10	0.585354	571.185859	553.601353	193.0074	-159.3507	465.2899	9.32572864e+08	9.222
0000694	0000694	2.82916673e+10	2.68671149e+10	0.533671	462.611938	546.986273	-107.7686	-163.0071	34.2014	3.05024256e+08	3.006
0000695	0000695	7.56913130e+10	6.89955528e+10	0.460778	563.051927	535.712026	-109.8027	-132.4456	505.0976	5.63149440e+08	5.616
0000696	0000696	5.83599516e+10	5.53904715e+10	0.570560	560.749953	528.704910	-16.6184	-41.3537	309.4347	7.26470720e+08	7.235
0000769	0000769	1.13717368e+11	1.05466515e+11	0.600397	465.459911	535.463701	-726.1875	-172.4822	245.0341	8.80693056e+08	8.778
0000952	0000952	2.85329292e+10	2.56768885e+10	0.445879	491.129095	572.062255	-6.8001	-77.5037	291.3482	2.26627080e+07	2.266
0000959	0000959	3.11137521e+10	2.78191431e+10	0.443384	490.382063	557.421126	51.8667	65.9536	262.1551	7.00018560e+07	6.564
0001019	0001019	1.72706969e+10	1.48019284e+10	0.398379	468.127522	564.783938	-288.5047	531.8032	335.6647	2.82158240e+08	2.806
0001093	0001093	3.44531224e+10	3.18349938e+10	0.452588	496.165970	576.300481	40.9937	50.2275	325.1873	1.24770768e+08	1.247
0001094	0001094	3.71763638e+10	3.43353516e+10	0.427765	503.856784	568.074573	65.5064	211.8096	316.4635	2.03956864e+08	2.025
0001100	0001100	6.15378860e+10	4.20410789e+10	0.553190	495.825741	586.170661	392.8997	32.0076	166.5928	9.79511280e+07	9.478
0001141	0001141	2.88101255e+10	2.75215957e+10	0.490714	517.793091	587.510322	207.2959	277.2164	191.7097	1.10937296e+08	1.109
0001191	0001191	4.12364543e+10	3.81269500e+10	0.587325	493.229237	581.834139	232.4431	-86.8086	175.2882	1.59662032e+08	1.581
0001192	0001192	1.53889831e+10	1.52402124e+10	0.440685	515.317762	586.313129	91.2934	180.2904	129.8394	1.87414912e+08	1.859
0001193	0001193	5.59516225e+10	4.92749094e+10	0.426859	521.694415	589.655969	129.7654	373.5364	256.4407	6.71034960e+07	6.710
0001194	0001194	6.66953816e+10	6.25949062e+10	0.434666	470.771116	567.852640	-137.5156	-62.0240	184.9538	1.07782157e+09	1.070
0001195	0001195	7.96510803e+10	7.22856925e+10	0.486534	489.340563	569.816984	77.8270	-165.1681	323.8461	5.37683584e+08	5.376
0001196	0001196	4.80363052e+10	4.65244253e+10	0.508451	504.219661	567.129546	64.0811	203.1056	273.2274	2.88882560e+08	2.858
0001197	0001197	6.63251151e+10	6.50528666e+10	0.576111	486.479508	569.069803	76.9814	-11.7804	695.5988	1.19068659e+09	1.186
0001198	0001198	3.78858055e+10	3.47335666e+10	0.465912	508.762025	582.632805	97.5919	254.9626	140.5863	2.60831600e+08	2.593
0001199	0001199	5.95038294e+10	5.58971376e+10	0.501615	515.968468	565.883801	75.4298	184.1922	209.0201	7.14560832e+08	7.116
0001219	0001219	5.84662001e+10	5.21048285e+10	0.517153	516.076553	568.137520	130.0036	162.8339	269.1529	3.84453152e+08	3.740
0001238	0001238	5.69930398e+10	5.50819505e+10	0.560352	516.658638	586.916763	65.8453	297.8771	82.4797	8.45562304e+08	8.441
0001259	0001259	6.30273455e+10	5.90618570e+10	0.437997	461.784371	465.330899	90.1806	-450.4080	-23.4411	1.07763110e+09	1.071
0001280	0001280	1.25767838e+11	1.20624025e+11	0.459934	502.223262	569.931405	82.8936	145.3544	306.5923	2.13994266e+09	2.107
0001301	0001301	1.89810585e+10	1.25993348e+10	0.529250	471.847726	473.160657	94.4576	82.8651	66.6287	3.61287920e+07	3.612
0001340	0001340	1.39133627e+10	1.28340579e+10	0.474195	517.923385	550.098300	138.4270	120.9707	240.8300	1.46452370e+07	1.464
0001451	0001451	2.47498530e+10	2.36174197e+10	0.488747	529.145139	554.179874	98.1980	214.5992	178.0994	3.37647240e+07	3.376
0001476	0001476	5.80918414e+10	5.43528204e+10	0.631053	523.618298	547.996473	236.4743	223.8195	204.0470	1.80627600e+08	1.806
0001477	0001477	3.25531146e+10	3.08495860e+10	0.445722	538.741174	535.948717	36.0828	274.7403	398.2145	4.08965240e+07	4.089
0001486	0001486	3.93050739e+10	3.81022532e+10	0.434259	476.822106	473.857265	128.0078	114.3960	108.7465	3.30707008e+08	3.262
0001506	0001506	3.63193358e+10	3.37167021e+10	0.542545	474.832451	469.542796	141.8163	46.9310	122.6255	1.95556112e+08	1.896
0001517	0001517	3.29163327e+10	2.84839217e+10	0.539390	458.906714	464.609245	144.8913	-203.9256	-235.7496	1.30791821e+09	1.255

1,1 Top

- Current platform for distributing data
  - HR5 wiki only for collaborators

FoF halo/substructure finding

astro.kias.re.kr/Horizon-Run5/index.php/FoF_halo/substructure_finding_data

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FoF halo/substructure finding data

This is the manual for reading halo/substructure finding data. FoF group haloes and substructures are identified from all mass components (cells and all kind of particles) using PGalF, following the two steps:

```
1) Finding FoF groups from all matter species (DM, star, and MBH particles and gas cells)
2) Finding substructure using total energy (potential + kinetic) argument.
```

Thus, a substructure can have all kind of the matter species or a part of them. The FoF halo/substructure finding data contains structure lists and individual particle/cell information in each structure.

Currently, FoF halo/substructure output files are located here: **/ramses2/jaehyun/HR5/FoF_Data/FoF.XXXXX**, where **XXXXX** is a snapshot number. You can find redshifts of the snapshots in the bottom part of this wiki page: Snapshot list

There are 6 files in each folder

```
FoF_halo_cat.XXXXX    : FoF halo list
FoF_member_particle.XXXXX  :  Individual particle/cell information in each FoF group halo
GALFIND.LIST.XXXXX : Substructure (self-bound object) list
GALFIND.DATA.XXXXX:  Individual particle/cell information in each substructure
GALFIND.CENTER.XXXXX : Position of the density peaks of substructures for DM, stars, and gas, separately.
background_ptl.XXXXX  : Unbound particle/cell list.
```

In principle, FoF haloes can be reconstructed by combining the background and GALFIND data. So, in this instruction, we only explain how to read GALFIND and background files.

1) **GALCATALOG.LIST.XXXXX**

This data contains the list of substructures. In this data, one FoF group halo has at least one substructure defined by measuring "self bound-ness" of particles and cells. This file begins with the following data structure which briefly show the number of substructures and the total number and mass of the mass species in a FoF group halo:

```
FoF={nsub:0L (4byte integer), ndm:0L (4byte integer), nstar:0L (4byte interger), nbh:0L (4byte integer), ngas:0L (4byte integer), npall:0L (4byte
integer), mtot:0.d0 (8byte real), mdm:0.d0 (8byte real), mgas:0.d0 (8byte real), mbh:0.d0 (8byte real), mstar:0.d0 (8byte real), pos(3): [0.d0, 0.d0,
0.d0] (3x8byte real), vel(3):[0.d0, 0.d0, 0.d0]  (3x8byte real)}
```

Each variable indicates the following properties.

```
nsub: the number of substructures in a FoF group
ndm: total number of DM particles in the FoF halo (subhalo+unbound)
nstar: total number of stellar particles in the FoF halo (subhalo+unbound)
nbh: total number of MBH particles in the FoF halo (subhalo+unbound)
ngas : the total number of gas cells in the FoF halo (subhalo+unbound)
npall: the total number of the all species in the FoF halo (subhalo+unbound)
mtot: the total mass of all the matter species (Msun/h)
mdm: total DM mass (Msun/h)
mgas: total gas mass (Msun/h)
mbh: total MBH mass (Msun/h)
mstar: total stelllar particle mass (Msun/h)
pos(3): mass-weighted position (3D, cMpc/h)
vel(3): mass-weighted velocity (3D, km/s)
```

Users keep in one's mind that the number and mass of each matter species in a FoF group contain not only those in bound objects but also those in unbounds. So one can get the number and mass of unbound matter components by subtracting those of substructures from those of a FoF structure. The unbound particles/cells in FoF groups are separately saved in **background_ptl.XXXXX**.

The data structures for substructures (subhaloes) come after the ***FoF*** data structure. The subhalo data structure has the following variables:

```
sub={ndm:0L (4byte integer), ngas:0L (4byte integer), nbh: 0L (4byte integer), nstar: 0L (4byte integer), npall: 0L (4byte integer), dum:0L (4byte
integer, dummy variable), mtot:0.d (8byte real), mdm:0.d (8byte real), mgas:0.d (8byte real), mbh:0.d (8byte real), mstar:0.d (8byte real), pos(3): [0.d0,
0.d0, 0.d0] (3x8byte real), vel(3): [0.d0, 0.d0, 0.d0] (3x8byte real)}
```

Each ***sum_sub*** structure is followed by the the number (***nsub*** in ***sum_sub***) of ***sub*** structures The list of ***sum_sub*** and ***sub*** data structures until the end of the file. By doing this, you can get self-bound objects in FoF haloes and substructure list for each snapshot. The orders of ***sum_sub*** and ***sub*** are adopted as the IDs of FoF group haloes and substructures, respectively, in each snapshot. The IDs begin with 0, following the numbering convention of C language.

2) **GALFIND.DATA.XXXXX**

Individual particles and cells forming self-bound substructures are listed in this file. This file has the following structure:

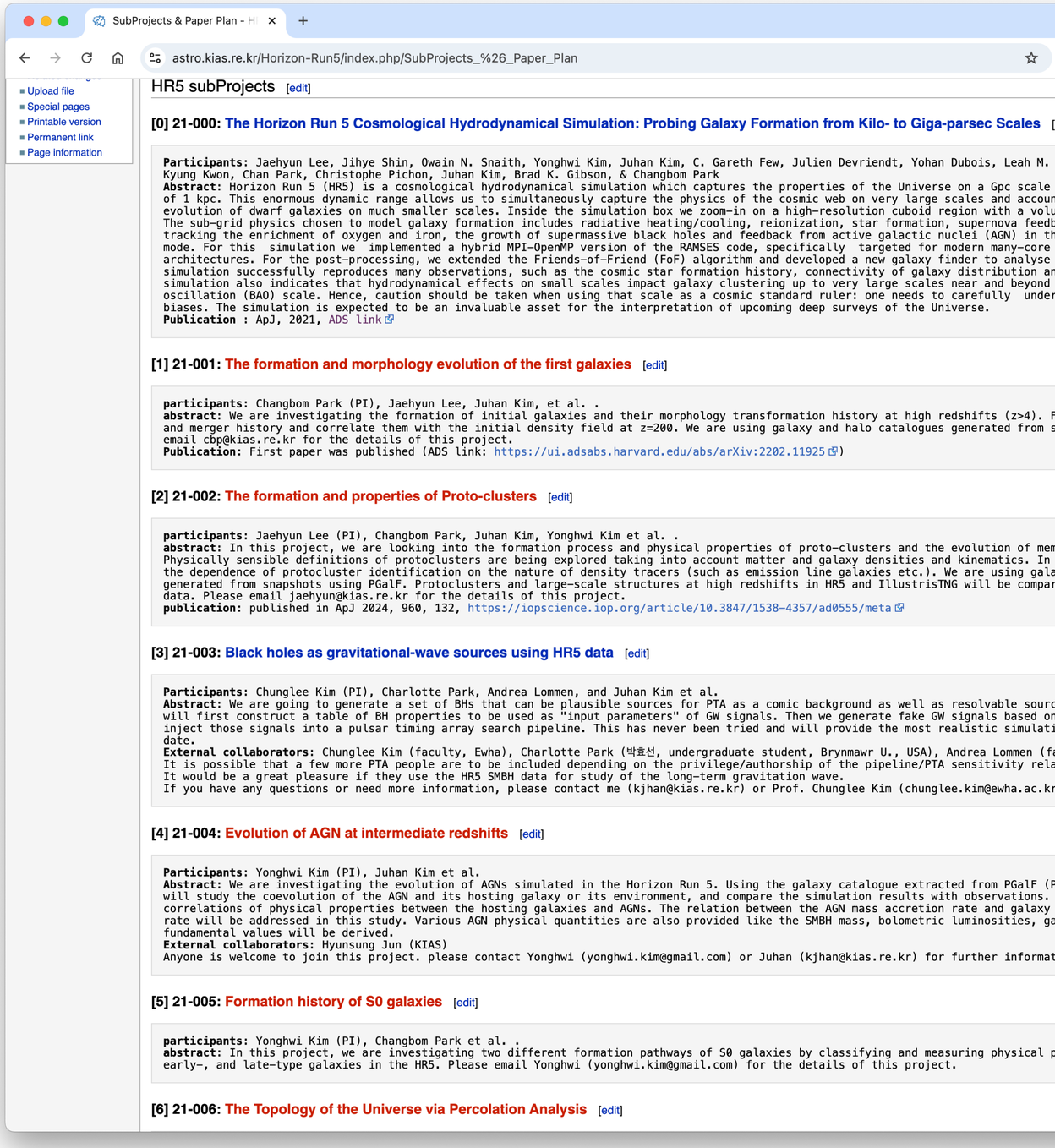
Halo/galaxy catalogues with r

astro.kias.re.kr/Horizon-Run5/index.php/Halo/galaxy_catalogues_with_reduced_properties_(data_links_included)

or Inf) are written as -9e-35 in the catalogues, for convenience.

Snapshot	Redshift	Look-back time (Gyr)	dx (kpc)	Galaxy catalogue	Halo catalogue	Substructure catalgoue
019	15.554721	13.523800	0.966496	Download	Download	Download
020	13.612885	13.470652	1.094929	Download	Download	Download
021	11.683815	13.396988	1.261456	Download	Download	Download
022	9.988802	13.304580	1.456034	Download	Download	Download
023	9.684819	13.284074	1.497458	Download	Download	Download
024	9.543608	13.274041	1.517514	Download	Download	Download
025	9.400131	13.263500	1.538449	Download	Download	Download
026	9.267290	13.253409	1.558354	Download	Download	Download
027	9.139117	13.243359	1.578053	Download	Download	Download
028	8.893551	13.223193	0.808611	Download	Download	Download
029	8.778047	13.213267	0.818163	Download	Download	Download
030	8.666444	13.203398	0.827609	Download	Download	Download
031	8.455649	13.183959	0.846059	Download	Download	Download
032	8.355551	13.174342	0.855111	Download	Download	Download
033	8.174484	13.156276	0.871987	Download	Download	Download
034	7.999337	13.137940	0.888958	Download	Download	Download
035	7.915587	13.128853	0.897309	Download	Download	Download
036	7.758315	13.111197	0.913422	Download	Download	Download
037	7.597814	13.092348	0.930473	Download	Download	Download
038	7.439765	13.072906	0.947898	Download	Download	Download
039	7.303730	13.055429	0.963427	Download	Download	Download
040	7.165570	13.036933	0.979728	Download	Download	Download
041	7.095128	13.027204	0.988253	Download	Download	Download
042	6.960229	13.007961	1.005001	Download	Download	Download
043	6.830832	12.988724	1.021607	Download	Download	Download
044	6.702480	12.968842	1.038631	Download	Download	Download
045	6.579410	12.948990	1.055496	Download	Download	Download
046	6.460904	12.929099	1.072261	Download	Download	Download
047	6.343500	12.908601	1.089403	Download	Download	Download
048	6.187642	12.880094	1.113026	Download	Download	Download
049	6.086672	12.860794	1.128885	Download	Download	Download
050	5.988520	12.841363	1.144739	Download	Download	Download
051	5.893843	12.821956	1.160461	Download	Download	Download
052	5.761454	12.793696	1.183182	Download	Download	Download
053	5.676952	12.774915	1.198157	Download	Download	Download
054	5.571501	12.750640	1.217383	Download	Download	Download
055	5.464131	12.724909	1.237604	Download	Download	Download
056	5.354196	12.697441	1.259016	Download	Download	Download
057	5.252396	12.670927	1.279515	Download	Download	Download
058	5.152584	12.643867	1.300272	Download	Download	Download
059	5.058296	12.617283	1.320509	Download	Download	Download
060	4.946066	12.584267	1.345433	Download	Download	Download
061	4.861740	12.558430	1.364788	Download	Download	Download
062	4.778472	12.531985	1.384455	Download	Download	Download

- HR5 Projects
  - HR5 intro paper: Lee & Shin+2021
  - HR5 data has been available since late 2021
    - Halo/galaxy finding data and catalogues
  - 34 projects have been proposed



- HR5 Projects
  - HR5 applications published/submitted
    - Park+22 : Formation and morphology evolution of first galaxies
    - Kim+23 : Missing low-surface-brightness galaxies in the galaxy stellar mass functions
    - Singh+23 : Local environmental effects on AGN
    - Lee+24 : New protocluster identification scheme
    - Lee S.-K.+24 : Star formation properties of clusters at z~1
    - Yoo+24 : Correlation between the distributions of ICL and dark matter
    - Rowntree+24: Environmental dependence of stellar mass-gas phase metallicity relation
    - Im+24 : Do Lyα emitters and LBGs trace large scale structures at high-z?
    - Hong+24 : Relation between galaxy morphology, star formation activity, and clusto-centric distance
    - Joo+ submitted : Formation history of ICL

- HR5 collaboration (old?) policy

1. (Definition and roles) HR5 collaborators are classified into Builders, Ordinary Members (hereafter OMs), and External Collaborators (hereafter ECs).

(1) The Builders are Yohan Dubois, Brad Gibson, Gareth Few, Juhan Kim, Yonghwi Kim, Jaehyun Lee, Changbom Park, Christophe Pichon, Jihye Shin, and Owain Snaith (in alphabetical order).
(2) The Collaboration Council (CoCo) is a Board composed of Builders, and is in charge of management of the HR5 data, and operation of the collaboration including research activity, publication, and press releases.
(3) The OMs are Julien Devriendt, Leah M. Cox, Sungwook E. Hong, Oh-Kyoung Kwon, and Chan Park.
(4) The Internal collaborators (ICs) include the Builders and OMs. Students supervised directly by the ICs will be considered OMs throughout the tenure of that association.
(5) The ECs refer to the researchers who do not fall under (1) and (2), but have access to the HR5 data under permission of the CoCo. The postdocs supervised by the ICs should have External Collaborator status.

2. (Rights)

(1) Builders have the right to claim authorship in all published papers using HR5 materials for the period specified below.
* **From January 1, 2021 to December 31, 2025** (a total of 5 years of opt-in period)
(2) OMs can freely propose and conduct research projects using the HR5 data.
(3) ECs may propose a new HR5-related project. In this case, ECs should submit research proposals to the CoCo to obtain an approval. There should be no conflict with ICs' extant HR5 projects.

- HR5 project proposal format

```
[1] Project title
[2] List of participants (PI and co_I if any)
[3] Short description on the project and data process
[4] Expected duration of the project
[5] Email address of the PI for communication between HR5 internal members
```

  - Note: This project should freely be proposed by the internal members and the PI of the proposed project should post this project on the HR5 wiki).

- Example

21-001: Simulated Intra Cluster Light at high redshifts (Juhan Kim, etc.)
We are going to study the stray star light in the cluster regions of HR5 using a new galaxy finder (PGalF).
The distributions of stray stars, metallicity, and many other properties will be derived and compared with the observations of intra cluster light.
We are thinking of one year basis of galaxy finding, analyzing and investigating the results. Active and vivid participation will be welcome. For more info. please contact me with kjhan@kias.re.kr.

• HR5 data release plan

- Galaxy and halo catalogues of snapshots will be open to the public before the end of March

  ✓ HR5 webpage is under construction

- Structure finding raw data will be available only on the KIAS clusters for a while

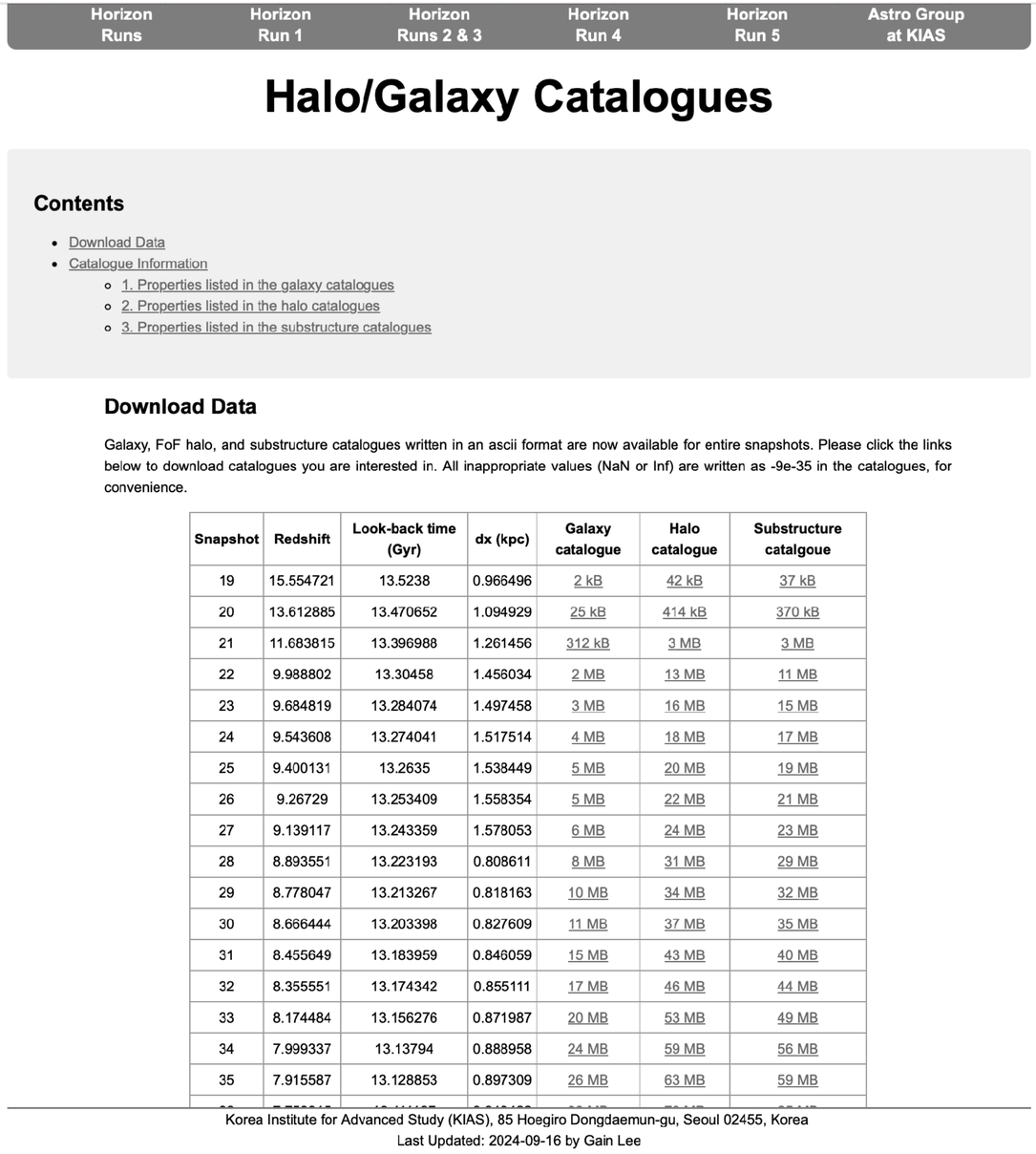
  - Data size is too large to be distributed on the web

    ✓ Structure finding raw data >150TB

    ✓ Snapshot data > 600TB

    ✓ Lightcone data ~ 100TB

  - Setting up public data server not available due to the security policy



Horizon Runs | Horizon Run 1 | Horizon Runs 2 & 3 | Horizon Run 4 | Horizon Run 5 | Astro Group at KIAS

Halo/Galaxy Catalogues

Contents

- Download Data
- Catalogue Information
  - 1. Properties listed in the galaxy catalogues
  - 2. Properties listed in the halo catalogues
  - 3. Properties listed in the substructure catalogues

Download Data

Galaxy, FoF halo, and substructure catalogues written in an ascii format are now available for entire snapshots. Please click the links below to download catalogues you are interested in. All inappropriate values (NaN or Inf) are written as -9e-35 in the catalogues, for convenience.

Snapshot	Redshift	Look-back time (Gyr)	dx (kpc)	Galaxy catalogue	Halo catalogue	Substructure catalgoue
19	15.554721	13.5238	0.966496	2 kB	42 kB	37 kB
20	13.612885	13.470652	1.094929	25 kB	414 kB	370 kB
21	11.683815	13.396988	1.261456	312 kB	3 MB	3 MB
22	9.988802	13.30458	1.456034	2 MB	13 MB	11 MB
23	9.684819	13.284074	1.497458	3 MB	16 MB	15 MB
24	9.543608	13.274041	1.517514	4 MB	18 MB	17 MB
25	9.400131	13.2635	1.538449	5 MB	20 MB	19 MB
26	9.26729	13.253409	1.558354	5 MB	22 MB	21 MB
27	9.139117	13.243359	1.578053	6 MB	24 MB	23 MB
28	8.893551	13.223193	0.808611	8 MB	31 MB	29 MB
29	8.778047	13.213267	0.818163	10 MB	34 MB	32 MB
30	8.666444	13.203398	0.827609	11 MB	37 MB	35 MB
31	8.455649	13.183959	0.846059	15 MB	43 MB	40 MB
32	8.355551	13.174342	0.855111	17 MB	46 MB	44 MB
33	8.174484	13.156276	0.871987	20 MB	53 MB	49 MB
34	7.999337	13.13794	0.888958	24 MB	59 MB	56 MB
35	7.915587	13.128853	0.897309	26 MB	63 MB	59 MB

Korea Institute for Advanced Study (KIAS), 85 Hoegiro Dongdaemun-gu, Seoul 02455, Korea
Last Updated: 2024-09-16 by Gain Lee

Being built by Gain Lee

- Summary

  - Many studies have recently been conducted by approved collaborators using HR5

    - 34 projects submitted, 11 papers published/submitted so far

  - HR5 will be released to the public soon, hopefully before the end of April

    - Galaxy/halo catalogues will be uploaded on the public HR5 webpage

    - Policy will be discussed/revised to make the HR5 raw data public

  ➡Contact us if you are interested in the raw data (cbp@kias.re.kr, kjhan@kias.re.kr, jaehyun@kasi.re.kr)

  ★Please stay tuned!