

Supplementary information: Mock lightcone files (SC SAM and Lu SAM)

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Table S1: contents and description of mock lightcone catalogs

	catalog field name	units	description
0	halo_id_nbody	--	unique halo id number
1	gal_id	--	galaxy id
2	gal_type	--	0=central, 1=satellite, 2=orphan
3	z_nopec	--	redshift not including peculiar velocity
4	redshift	--	redshift including peculiar velocity
5	ra	degree	Right Ascension sky coordinate
6	dec	degree	Declination sky coordinate
7	m_vir	$1.0E10 M_{\text{sun}}$	distinct host halo virial mass
8	V_vir	km/s	distinct host halo virial velocity
9	r_vir	Mpc	distinct host halo virial radius
10	c_NFW	--	Navarro-Frenk-White concentration parameter of (sub-)halo
11	spin	--	dimensionless spin parameter (Peebles definition) of (sub-)halo
12	mstar_diffuse	$1.0E10 M_{\text{sun}}$	mass of stars in a diffuse stellar halo
13	m_hot_halo	$1.0E10 M_{\text{sun}}$	mass of gas in a hot circumgalactic gaseous halo
14	Z_hot_halo	Z_{sun}	metallicity of hot circumgalactic halo gas
15	v_disk	km/s	rotation velocity of DM halo at 2 NFW halo scale radii
16	r_disk	kpc	exponential scale radius of baryonic disk (stars + cold gas)
17	sigma_bulge	km/s	line-of-sight velocity dispersion of stellar bulge component
18	rbulge	kpc	3D half stellar mass radius of stellar bulge component
19	mhalo	$1.0E10 M_{\text{sun}}$	mass of (sub-) halo
20	mstar	$1.0E10 M_{\text{sun}}$	stellar mass of galaxy
21	mcold	$1.0E10 M_{\text{sun}}$	mass of cold gas in ISM
22	mbulge	$1.0E10 M_{\text{sun}}$	stellar mass of bulge component
23	mbh	$1.0E10 M_{\text{sun}}$	mass of black hole
24	maccdot	M_{sun}/yr	total accretion rate onto black hole
25	maccdot_radio	M_{sun}/yr	accretion rate onto black hole associated with "radio mode"
26	Zstar	Z_{sun}	mass-weighted metallicity of stars
27	Zcold	Z_{sun}	mass-weighted metallicity of cold gas
28	mstardot	M_{sun}/yr	instantaneous star formation rate

29	sfr_ave	M_{sun}/yr	star formation rate averaged over past 100 Myr
30	meanage	Gyr	mean stellar mass weighted age of stars
31	tmerge	Gyr	time since last merger with mass ratio greater than 0.1
32	tmajmerge	Gyr	time since last merger with mass ratio greater than 0.25
33	cosi	--	cosine of disk inclination angle relative to observer
34	UV1500_rest	AB mag	intrinsic rest frame magnitude of galaxy (no dust)
35	UV1500_rest_bulge	AB mag	intrinsic rest frame magnitude of bulge component (no dust)
36	UV1500_rest_dust	AB mag	rest frame magnitude of galaxy including dust attenuation
37-66	...	AB mag	rest frame magnitudes in additional filter bands -- see file header
67	galex_FUV	AB mag	intrinsic observed frame magnitude of galaxy (no dust)
68	galex_FUV_bulge	AB mag	intrinsic observed frame magnitude of bulge component (no dust)
69	galex_FUV_dust	AB mag	observed frame magnitude of galaxy including dust attenuation
70-141	...	AB mag	observed frame magnitudes in additional filter bands -- see file header

Notes:

Hosts and subs: A "sub-halo" is a halo that is contained within another virialized halo. A virialized halo that is not a "sub" of any other halo is called a "distinct host". Host halos in the SAMs may contain many galaxies, which can be divided into the "central" galaxy and "satellite" galaxies which are contained within their own "subhalo". Some SAMs further identify "orphans", which are galaxies whose sub-halos can no longer be identified within the N-body simulation. It may be useful to keep in mind that Columns 7--9 refer to properties of the *host* halo; therefore, if a particular galaxy is a "sub" (*gal_type*=1 or 2), these properties will tell you about the larger scale environment, not the halo in which that galaxy formed. Similarly, column 7 and 19 will be the same for central galaxies, but not for satellites and orphans. The recorded sub-halo properties (columns 10, 11, 19) are the values at the timestep just before the halo becomes a sub.

Halo virial quantities (virial mass, radius, and velocity, columns 7, 8, and 9) are defined using the redshift dependent overdensity definition of Bryan & Norman (1998), defined in Eqn. 1 of Rodriguez-Puebla et al. (2016).

Selection and missing data: Galaxies are selected for output in the mock if they reside in a halo more massive than $1.0E10 M_{\text{sun}}$ and have an observed frame magnitude in the (dust-extinguished) F160W band brighter than 28 AB. Therefore, although the SC and Lu SAMs were run on the same underlying sample of halos, because they assign different magnitudes to the galaxies that form within those halos, the catalogs may not contain the same number of objects and may not contain exactly the same halos.

Not all quantities are currently available for both SAMs. In this case, a placeholder value (such as -99) is written so that the file format remains identical for both models.

Disk sizes: The recorded disk scale length (column 16, `r_disk`) for the SC SAM catalogs is the scale length of stars plus gas -- divide this by a factor of 1.7 to obtain an approximation for the stellar scale length.

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"This work has made use of the flathub data hub at the Flatiron Institute, which is supported by the Simons Foundation."