A new set up images can be found below. Feel free to skip down there and have a look. Please flag any issues you spot to me immediately. One issue you'll notice is that some galaxies (though it's rare) are missing. I'm sorting this out, but this is a small enough number of systems we can manually remove them for now and hopefully I'll have this sorted out very soon. For those who are interested, some more details about the full pipeline can be found below.

The available galaxy field meta data are:

- **SubhaloBHMass** -- Sum of the masses of all blackholes in this subhalo.
- **SubhaloCM** -- Center of mass of the Subhalo, computed as the sum of the mass weighted relative coordinates of all particles/cells in the Subhalo, of all types.
- **SubhaloGasMetalFractions** -- Mass-weighted average element abundance (Mx/Mtot, where X = H, He, C, N, O, Ne, Mg, Si, Fe) of the gas cells bound to this Subhalo, but restricted to cells within '''twice''' the stellar half mass radius.
- **SubhaloGasMetalFractionsHalfRad** -- Same as SubhaloGasMetalFractions, but restricted to cells within the stellar half mass radius.
- **SubhaloGasMetalFractionsMaxRad** -- Same as SubhaloGasMetalFractions, but restricted to cells within the radius of $V_{\rm max}$.
- **SubhaloGasMetalFractionsSfr** -- Mass-weighted average element abundance (Mx/Mtot, where X = H, He, C, N, O, Ne, Mg, Si, Fe) of the gas cells bound to this Subhalo, but restricted to cells which are star forming.
- **SubhaloGasMetalFractionsSfrWeighted** -- Same as SubhaloGasMetalFractionsSfr, but weighted by the cell star-formation rate rather than the cell mass.
- **SubhaloGasMetallicity** -- Mass-weighted average metallicity (Mz/Mtot, where Z = any element above He) of the gas cells bound to this Subhalo, but restricted to cells within '''twice''' the stellar half mass radius.
- **SubhaloGasMetallicityHalfRad** -- Same as SubhaloGasMetallicity, but restricted to cells within the stellar half mass radius.
- **SubhaloGasMetallicityMaxRad** -- Same as SubhaloGasMetallicity, but restricted to cells within the radius of $V_{\rm max}$.
- **SubhaloGasMetallicitySfr** -- Mass-weighted average metallicity (Mz/Mtot, where Z = any element above He) of the gas cells bound to this Subhalo, but restricted to cells which are star forming.
- **SubhaloGasMetallicitySfrWeighted** -- Same as SubhaloGasMetallicitySfr, but weighted by the cell star-formation rate rather than the cell mass.
- **SubhaloGrNr** -- Index into the Group table of the FOF host/parent of this Subhalo.
- **SubhaloHalfmassRad** -- Radius containing half of the total mass (SubhaloMass) of this Subhalo.
- **SubhaloHalfmassRadType** -- Radius containing half of the mass of this Subhalo split by Type (SubhaloMassType).

- **SubhaloLenType** -- Total number of member particle/cells in this Subhalo, separated by type.
- **SubhaloMass** -- Total mass of all member particle/cells which are bound to this Subhalo, of all types. Particle/cells bound to subhaloes of this Subhalo are NOT accounted for.
- **SubhaloMassInHalfRad** -- Sum of masses of all particles/cells within the stellar half mass radius.
- **SubhaloMassInHalfRadType** -- Sum of masses of all particles/cells (split by type) within the stellar half mass radius.
- **SubhaloMassInMaxRad** -- Sum of masses of all particles/cells within the radius of $V_{\rm max}$.
- **SubhaloMassInMaxRadType** -- Sum of masses of all particles/cells (split by type) within the radius of $V_{\rm max}$.
- **SubhaloMassInRad** -- Sum of masses of all particles/cells within '''twice''' the stellar half mass radius.
- **SubhaloMassInRadType** -- Sum of masses of all particles/cells (split by type) within '''twice''' the stellar half mass radius.
- **SubhaloMassType** -- Total mass of all member particle/cells which are bound to this Subhalo, separated by type. Particle/cells bound to subhaloes of this Subhalo are NOT accounted for.
- **SubhaloPos** -- Spatial position within the periodic box of size 75000 ckpc/h: position of the max bound particle. ''Comoving coordinate.''
- **SubhaloSFR** -- Sum of the individual star formation rates of all gas cells in this subhalo.
- **SubhaloSFRinHalfRad** -- Same as SubhaloSFR, but restricted to cells within the stellar half mass radius.
- **SubhaloSFRinMaxRad** -- Same as SubhaloSFR, but restricted to cells within the radius of $V_{\rm max}$.
- **SubhaloSFRinRad** -- Same as SubhaloSFR, but restricted to cells within '''twice''' the stellar half mass radius.
- **SubhaloStellarPhotometrics** -- Eight bands: U, B, V, K, g, r, i, z
- **SubhaloStellarPhotometricsMassInRad** -- Sum of the mass of the stellar particles bound to this SUBF halo, but restricted to stars within the radius SubhaloStellarPhotometricsRad
- **SubhaloVel** -- Peculiar velocity of the group, computed as the sum of the mass weighted velocities of all particles/cells in this group, of all types.
- **SubhaloVelDisp** -- 1D Velocity Dispersion of all the particles/cells associated to a SUBF halo (proper units)
- **SubhaloVmax** -- Maximum Value of the spherically-averaged Rotation Curve of this Subhalo.
- **SubhaloVmaxRad** -- Position of rotation curve maximum ("the radius of $V_{\rm max}$").

This is only a partial write up and is very incomplete. I'll try to start flushing out this document as a resource as we finish up the production of these images.

I've now set up static links that allow for easy downloading of the Illustris Image Pipeline raw data. These images are the base for the mock SDSS images that we've created, but lack the noise, PSF blurring, resizing, pixel-scaling, etc. which are done in post-processing. These images have a field of view which is 25x the stellar half mass radius, and all images have 256x256 pixels. The raw broadband files contain image extensions for 36 bands, including the SDSS ugriz bands. The idealized images can be found from links of the following form:

`http://illustris.rc.fas.harvard.edu/data/illustris_images_bc03/subdir_XXX/broadband_YYY.fits`

There are two replaceable parts of this URL: the subdirectory number (XXX) and the galaxy ID (YYY). This file system was setup with the simple purpose of limiting the number of files in any one directory for easier/quicker information access. In order to extract a galaxy, you need a valid pair of galaxy IDs and subdirectory number. Valid pairs of subdirectory numbers and galaxy IDs can be found in the in the directory catalog, which can be downloaded from here

`http://illustris.rc.fas.harvard.edu/data/illustris_images_aux/directory_catalog_135.txt`

In its current form, the directory catalog contains just three columns: subdirectory, galaxy ID, and log stellar mass. We can add the necessary fields to populate Galaxy Zoo's meta data needs.

The raw broadband files can be interacted with in many ways, but we have specifically build the Sunpy python module to be used to open, manipulate, and plot these images. Specifically, Sunpy contains all of the core routines used to make the mock SDSS galaxy images to be used in Galaxy Zoo from the idealized broadband.fits files. The Sunpy module can be found here:

`https://github.com/ptorrey/sunpy`

To see some basic examples of how one would use Sunpy, you can look in the examples folder which contain working examples of how one can wget a few raw fits files and turn them into mock SDSS galaxies. This makes all of the images shown below very reproducible, and easy to modify.

The processed galaxy zoo PNG files can also be directly accessed through URL's of the following form:

`http://illustris.rc.fas.harvard.edu/data/illustris_images_bc03/subdir_002/synthetic_image_104798_camera_0_bg_0.png`

The directory structure is the same, but we now also have values for the camera and background. Based on previous conversations, I've rendered (or am rendering) each galaxy from 4 viewing angles, with 4 SDSS background fields. As such, one could replace the camera value with a value 0-3 and the background value with a value 0-3. We've also stored the SDSS gri fits files for each of galaxy/background/viewing-angle after all of the post-processing image realism. These files can be downloaded from links of the following form

`http://illustris.rc.fas.harvard.edu/data/illustris_images_bc03/subdir_002/synthetic_image_104798_band_3_camera_0_bg_0.fits`

where band 3,4,5 are the SDSS g,r,i band, respectively. The images (should be) in proper nanomaggie units, but let me know if anything seems off here.

Obviously I can also provide a single tar ball of the images and/or fits files, depending on what works best.

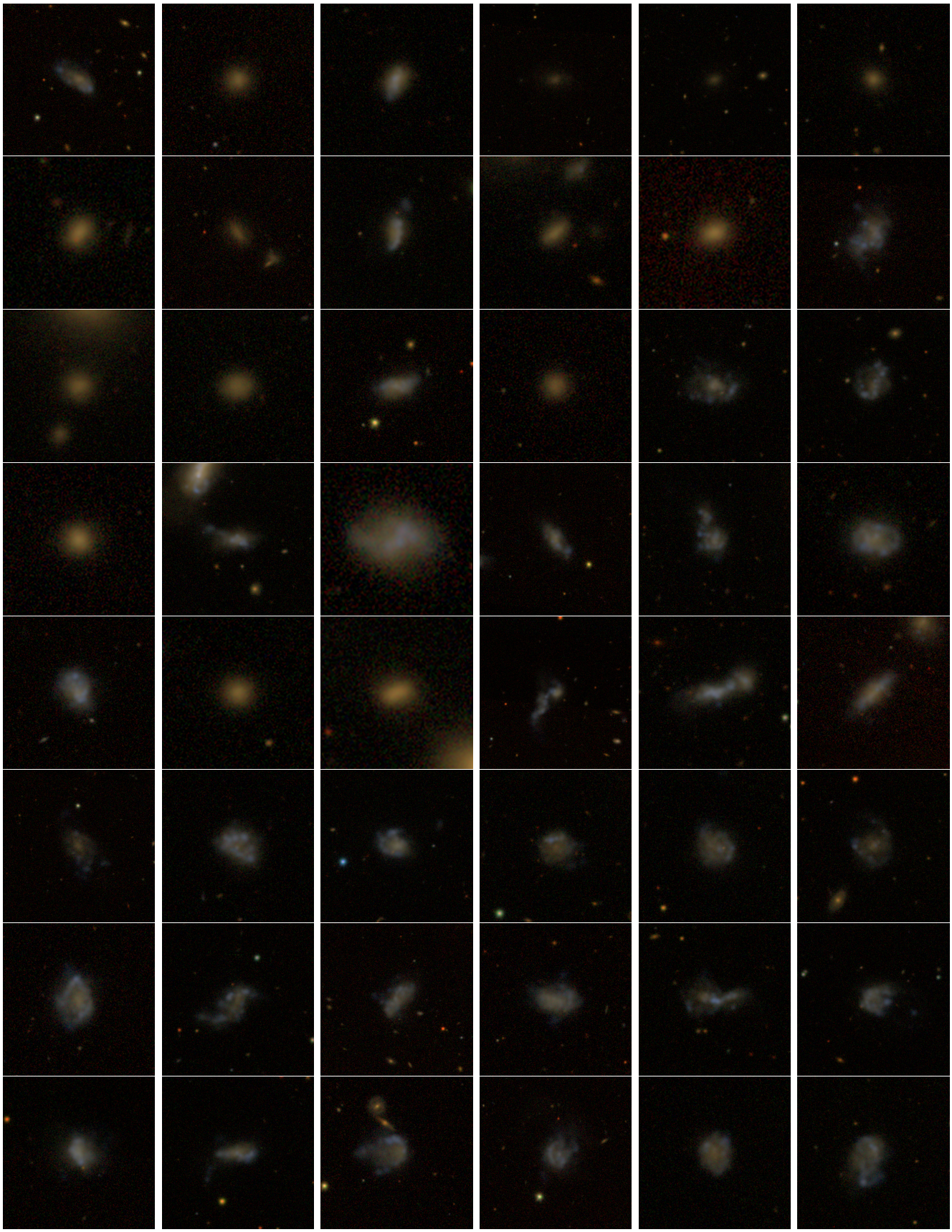

FIGURE 1. $10^{10} M_{\odot} < M_{*} < 10^{10.5} M_{\odot}$

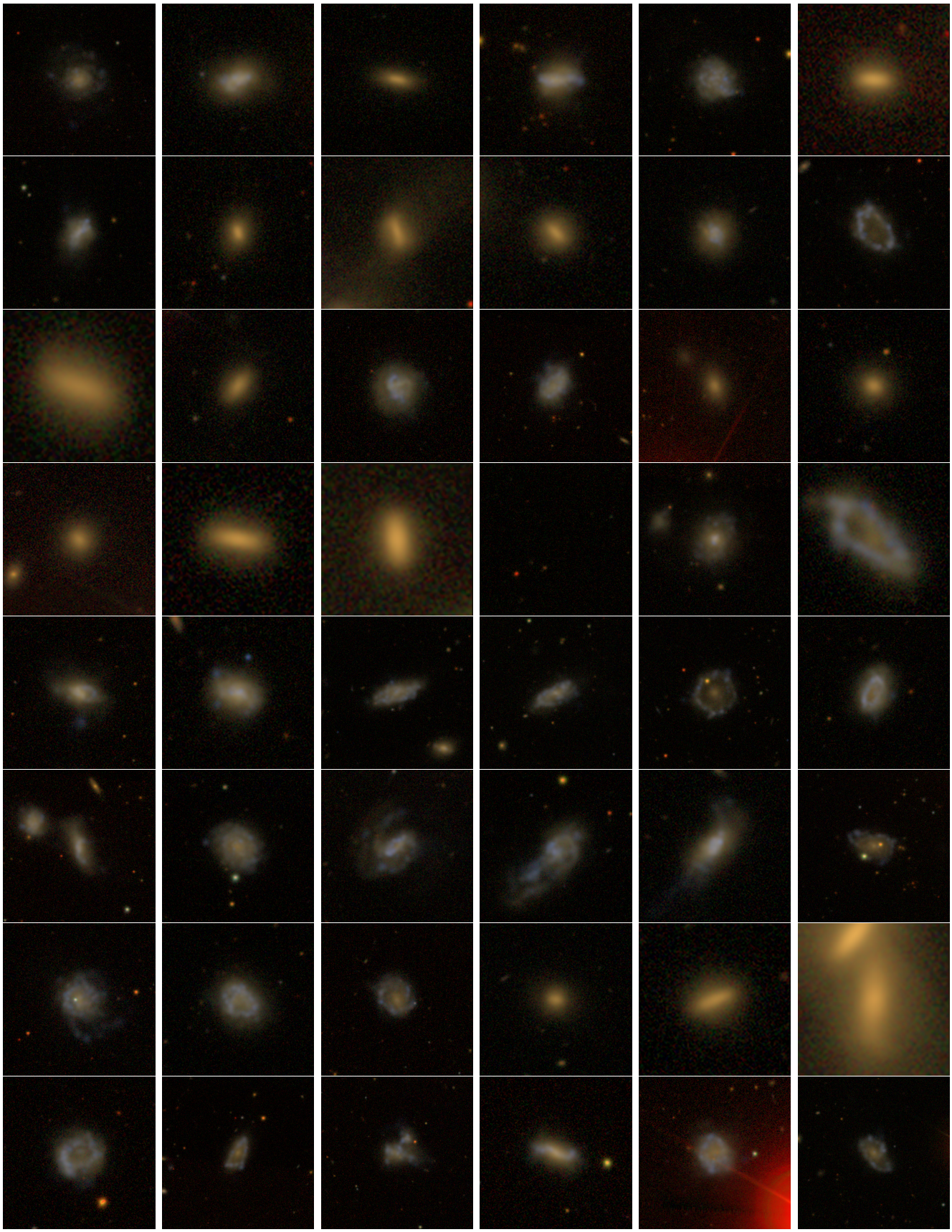

FIGURE 2. $10^{10.5} M_{\odot} < M_{*} < 10^{11} M_{\odot}$

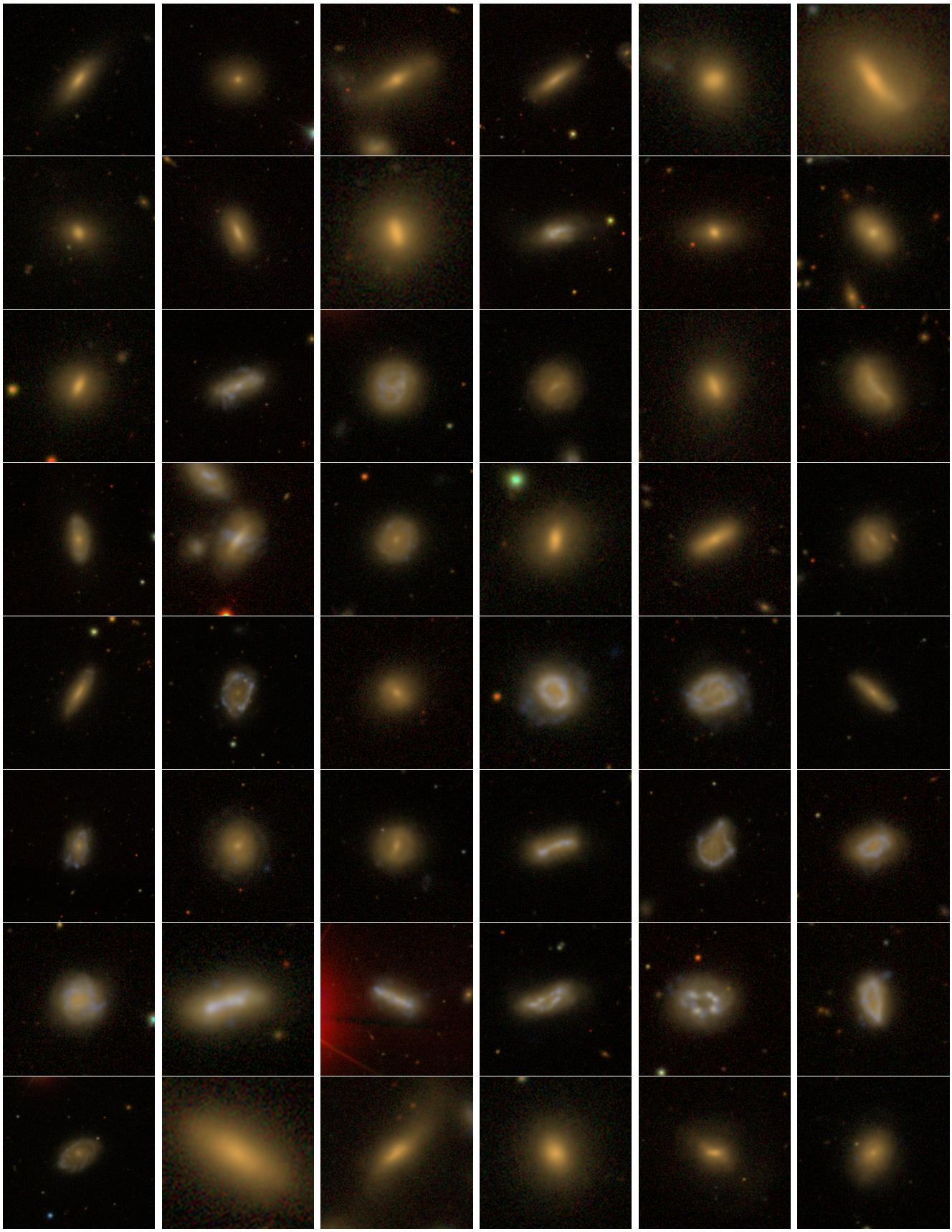

FIGURE 3. $10^{11} M_{\odot} < M_{*} < 10^{11.5} M_{\odot}$

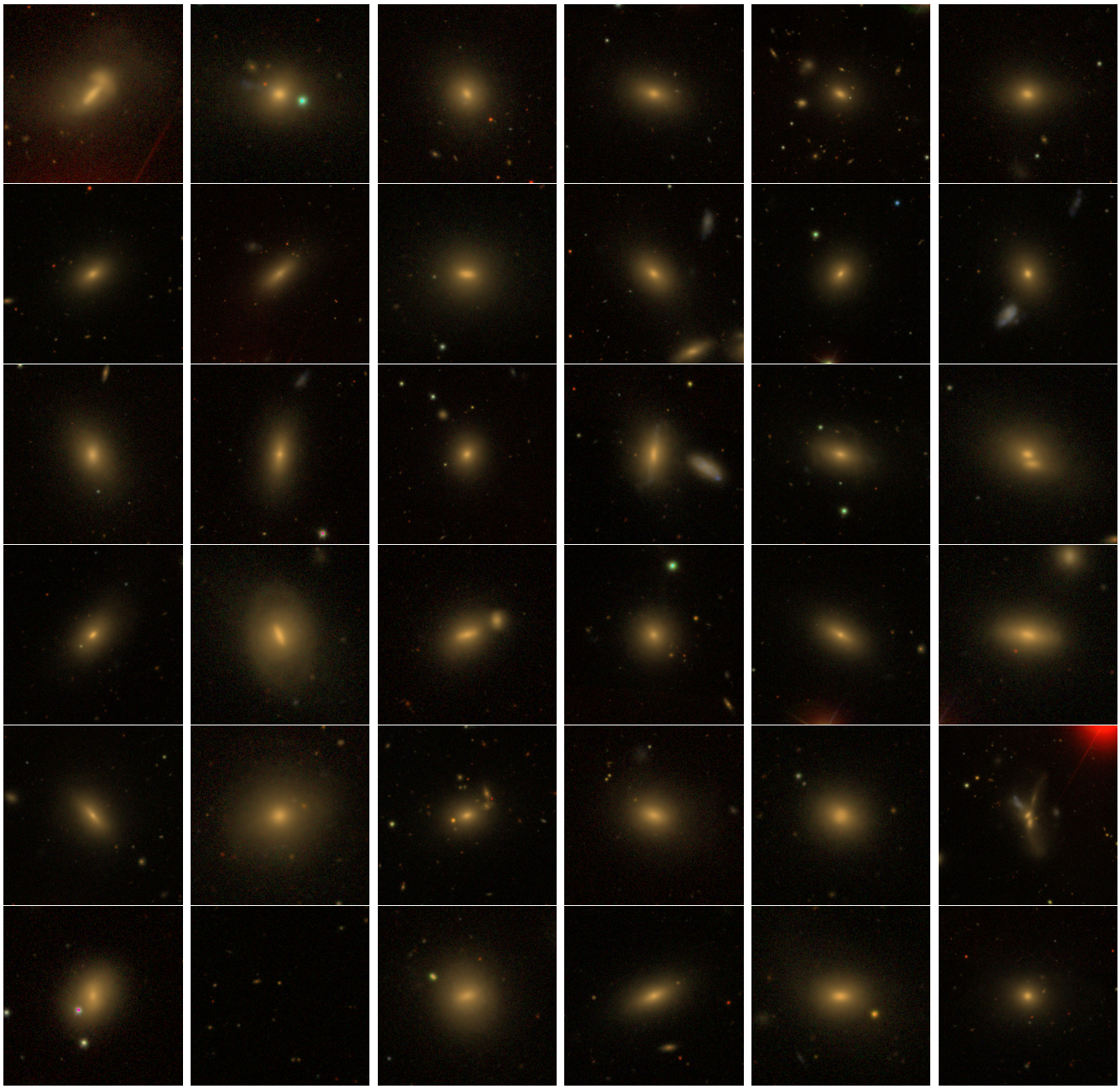

FIGURE 4. $10^{11.5} M_\odot < M_* < 10^{12} M_\odot$