

DETAILED
ANATOMY OF
GALAXIES

THE UV SIDE OF DAGAL

Detailed Anatomy of GALaxies (DAGAL)
Work Package WP3 ESR - Alexandre Bouquin
Host Institution: Universidad Complutense de Madrid (UCM)

March 4, 2013, Oulu, Finland



Brief Overview of what's going on in the UV

- Discovery of galaxies with extended star-forming regions (Gil de Paz, 2005; Thilker, 2005), with strong UV emissions. These were mainly found in spiral galaxies. Hence, these were coined “Extended UV disks galaxies” or XUV disks galaxies.
- They can be categorized into two types: Type 1 and Type 2 (Thilker et al., 2007)
- Prior attempts to GALEX photometry on a volume-limited sample ($d < 11$ Mpc) (LVL) by Lee, Gil de Paz, 2009, 2011, was limited to ~ 350 galaxies. DAGAL will extend this analysis to a factor of 10x, and up to a distance of $d < 40$ Mpc.
- The trigger mechanism of such bursts of star-formation in extended regions of a galaxy is still unknown and needs further analysis.

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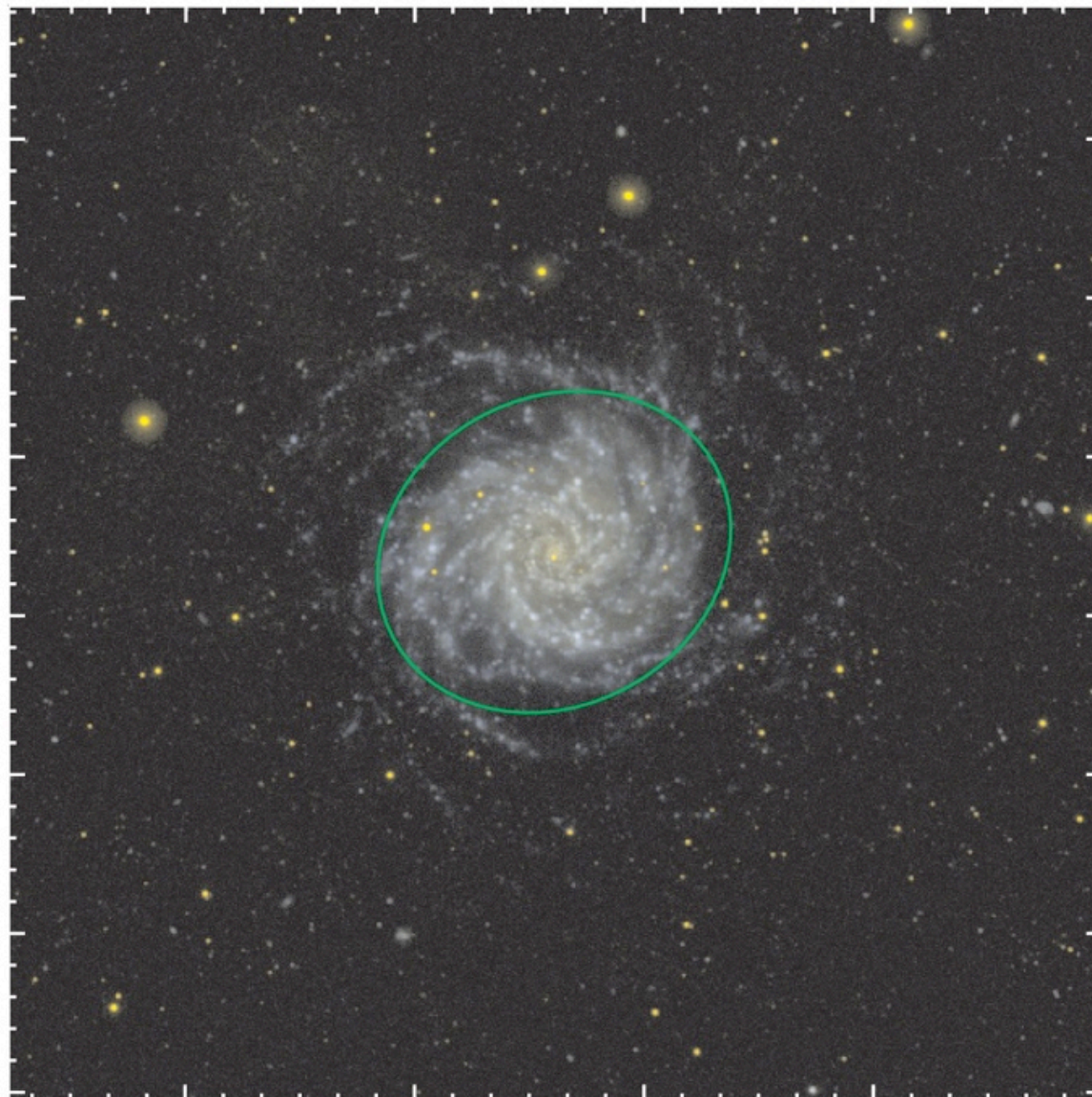
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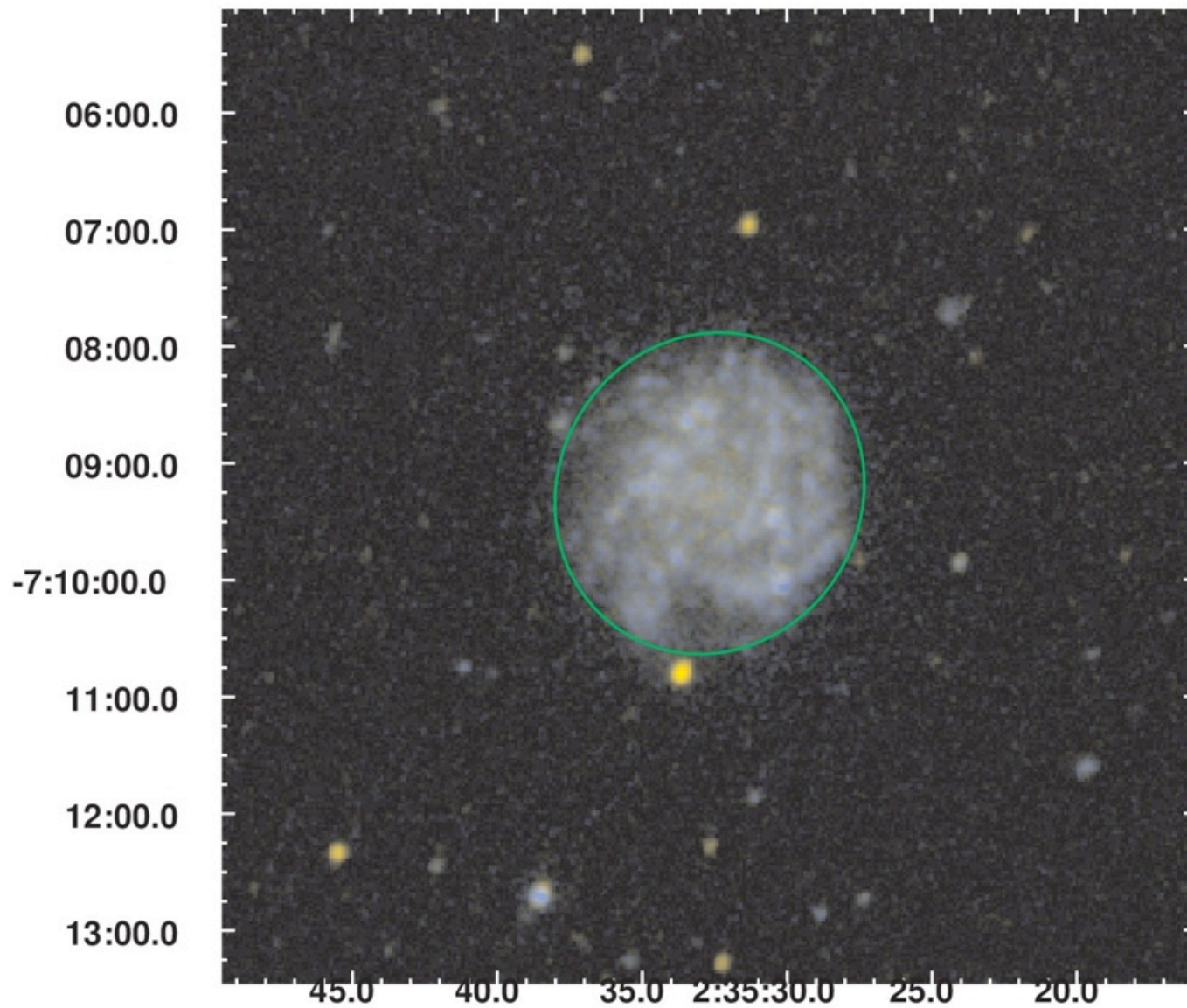
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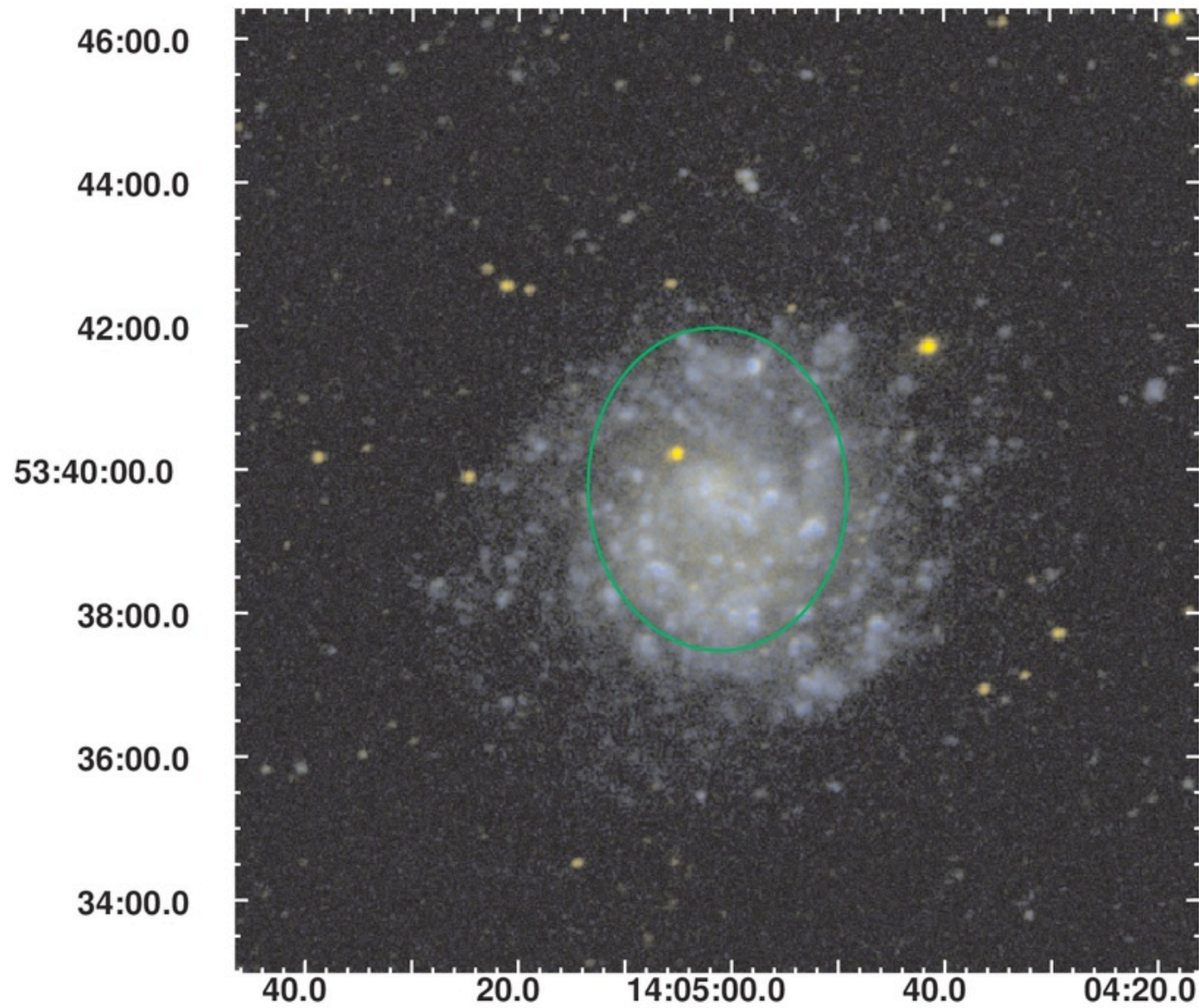
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NGC0628
(Type I XUV)



NGC0991
(Type 2 XUV)



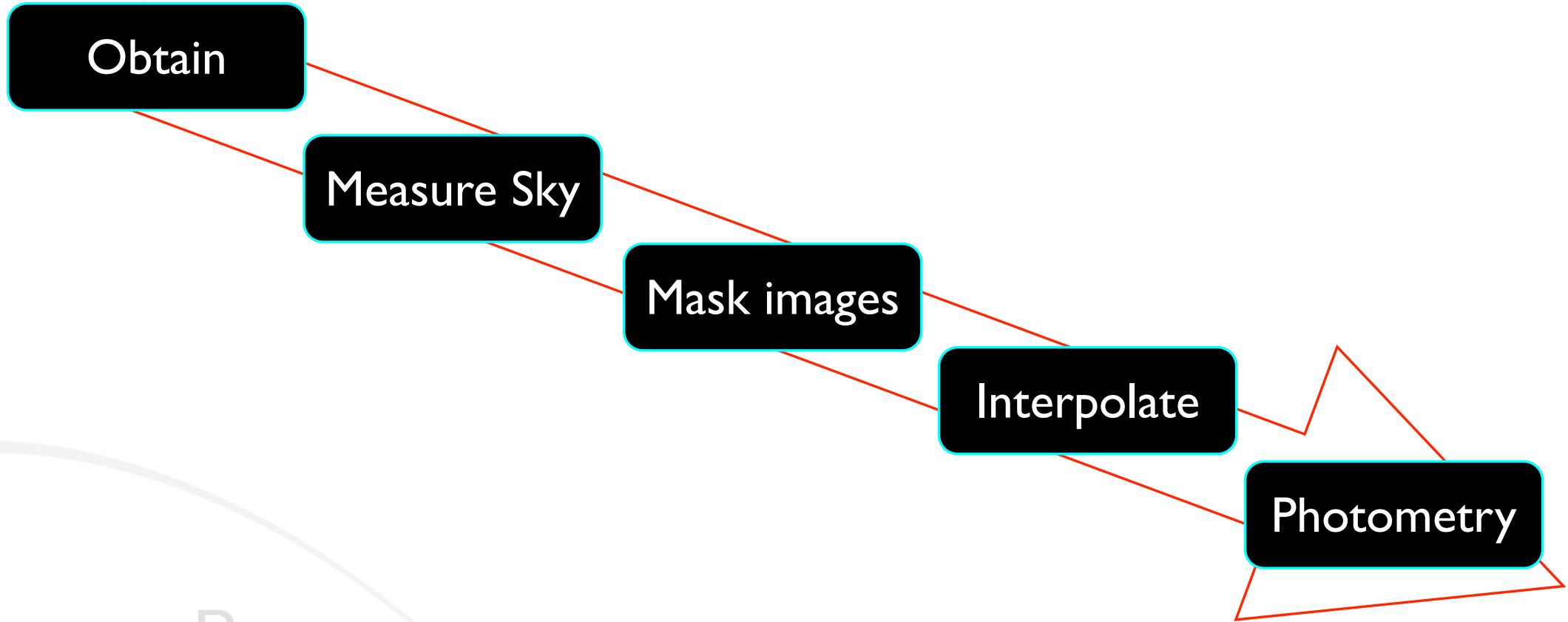
NGC5474
(Intermediate
Type I&2 XUV)

WP3: Goals

- Task 3.1 Disk truncation and extended-UV disks
 - ▶ Identification of a sample of extended-UV (XUV) disks within the S⁴G sample using the criteria from Thilker et al. (2007) by the means of IRAC and GALEX data. Roughly 450 type-1 and 250 type-2 extended-UV disks expected.
 - ▶ Investigate the past star formation history of the XUV disks, using an analysis of the IRAC surface brightness profiles, as well as GALEX UV profiles, in both XUV and non-XUV disk galaxies. Study of the truncation of stellar disks in both samples.

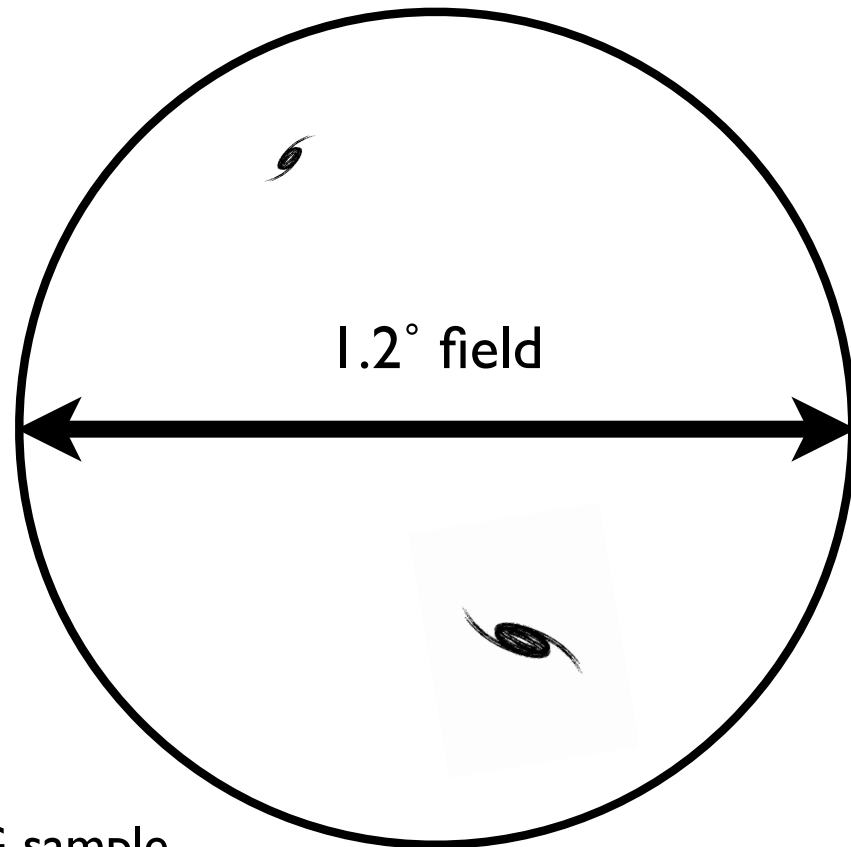


Work Flow



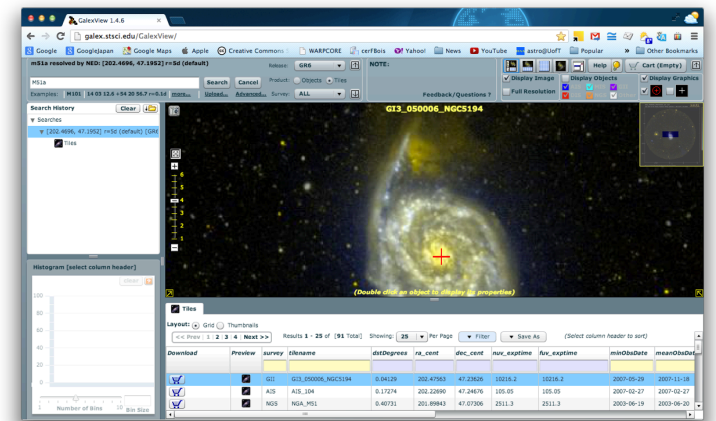
GALEX SAMPLE

- GALEX data release GR6
- selection of galaxies:
 - at $r < 0.6^\circ$ within the field-of-view “tile”
 - highest exposure times available in FUV and NUV from surveys such as AIS, NGS, etc...
- acquired:
 - intensity maps (*_int.fits.gz)
 - object masks (*_objmask.fits.gz)
 - relative response (*_rrhr.fits.gz)(each in both FUV and NUV)
of the same galaxies present in the S⁴G sample



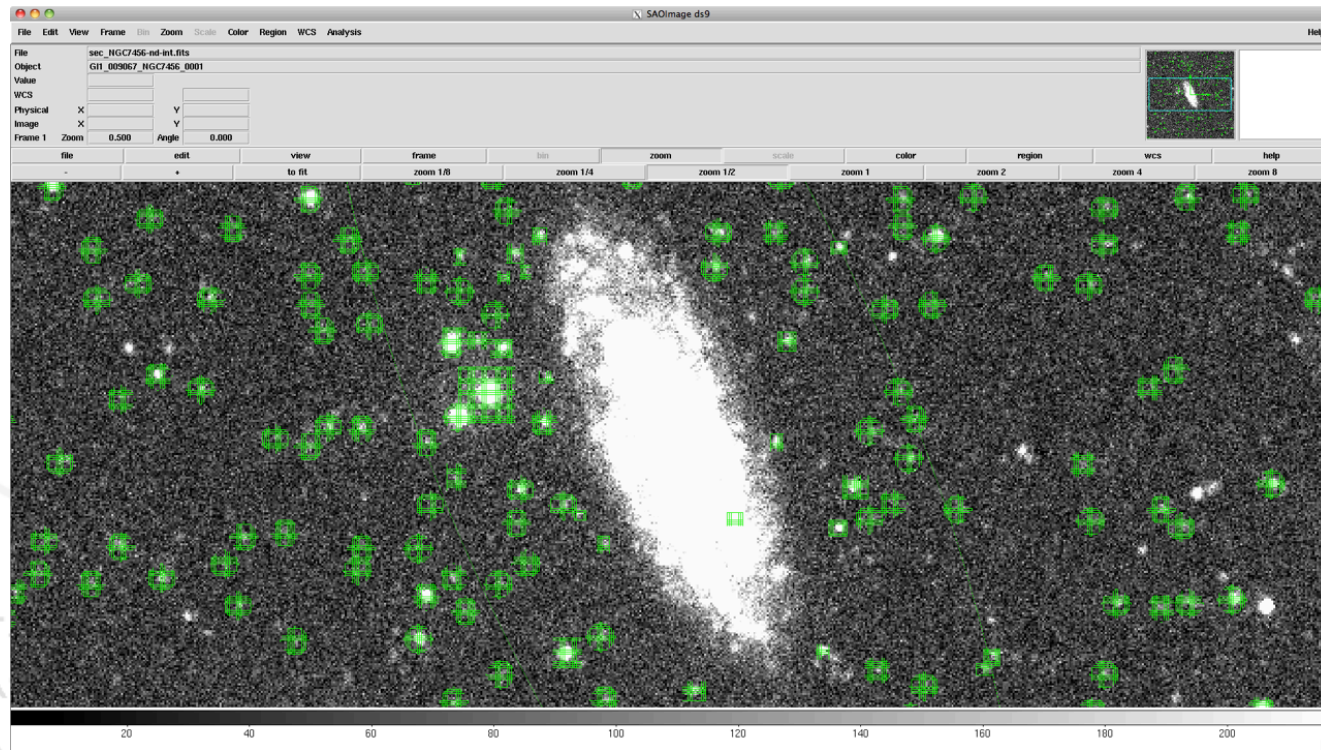
GALEXVIEW 1.4.6

- obtained GALEX tiles from GALEXVIEW 1.4.6
- galex.stsci.edu/GalexView/
- From the initial S4G sample of 2,331 galaxies, we obtained 1,629 corresponding GALEX tiles (~70% coverage)
- Tiles are from AIS, MIS, GI, NGA, and everything available.



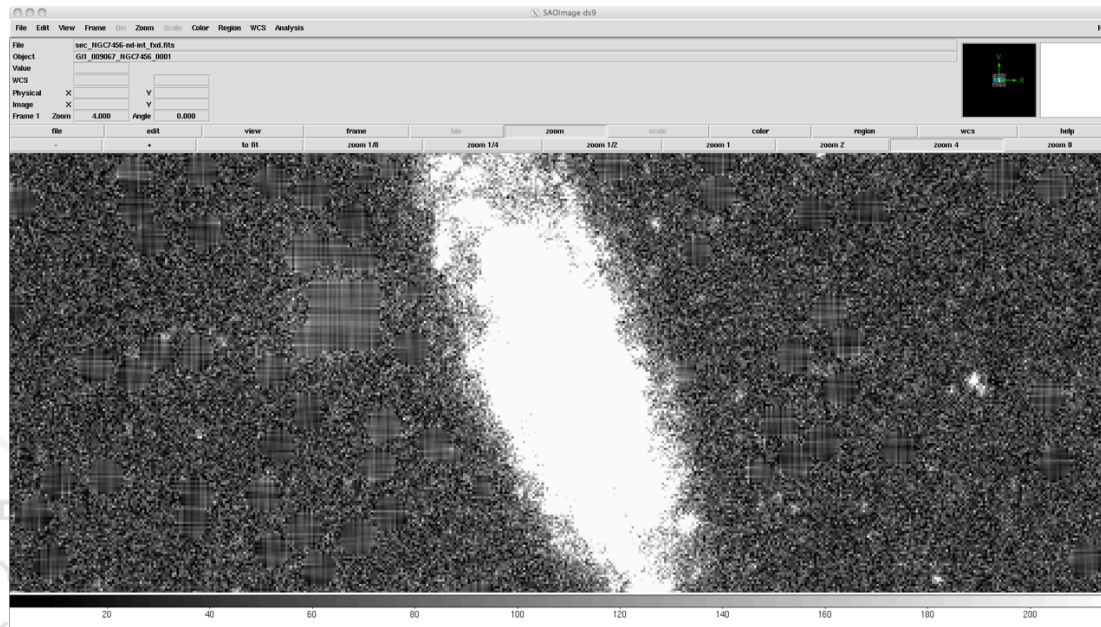
Masking

- Visual inspections and manual corrections of masks.



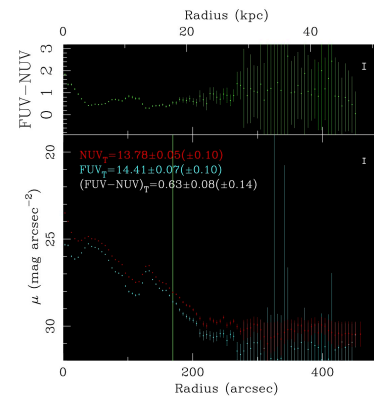
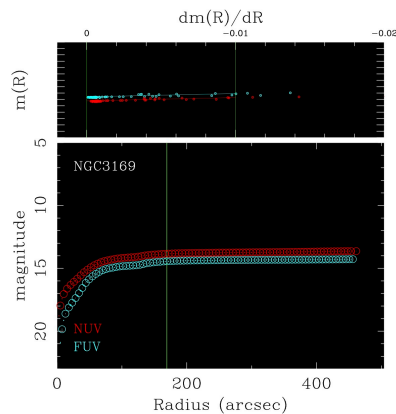
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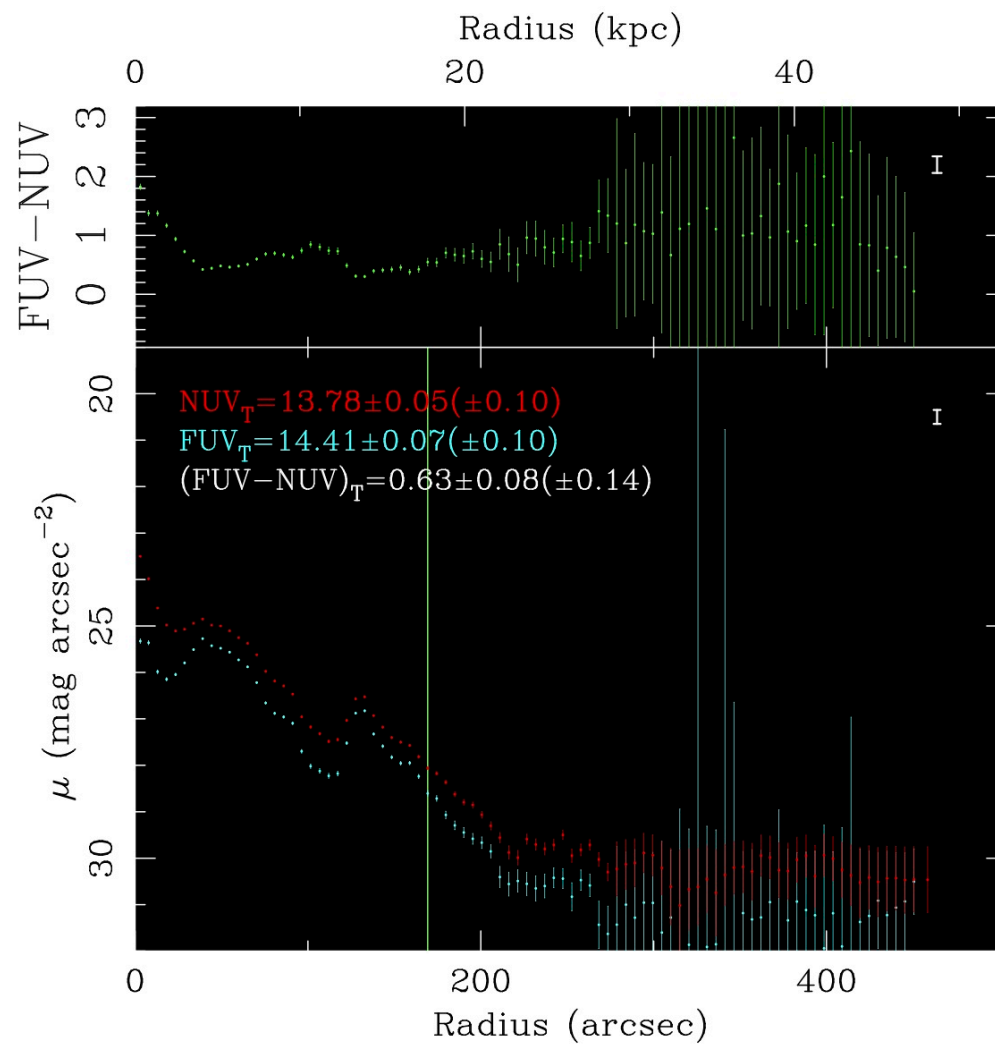
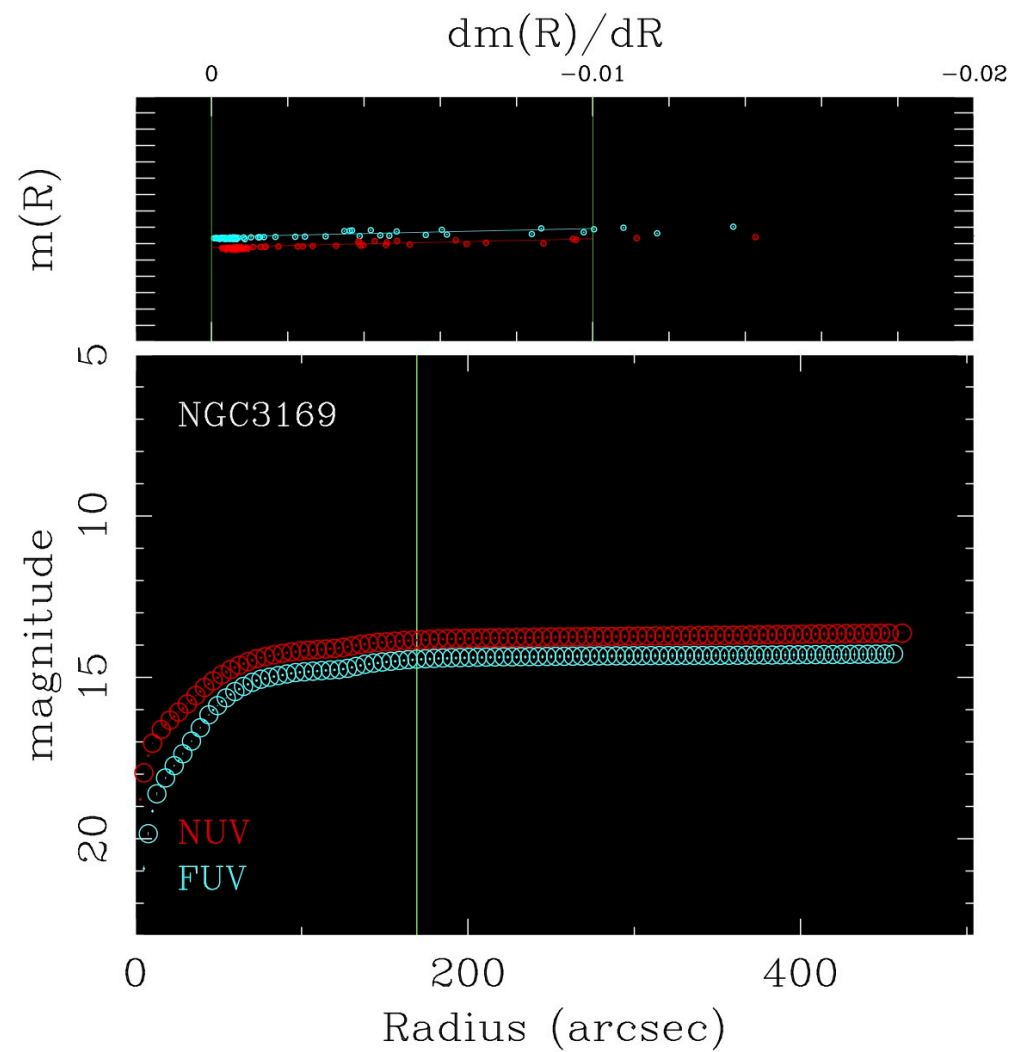
- an interpolation method was used to “fill the holes” that appear after the masking process.



Surface Photometry

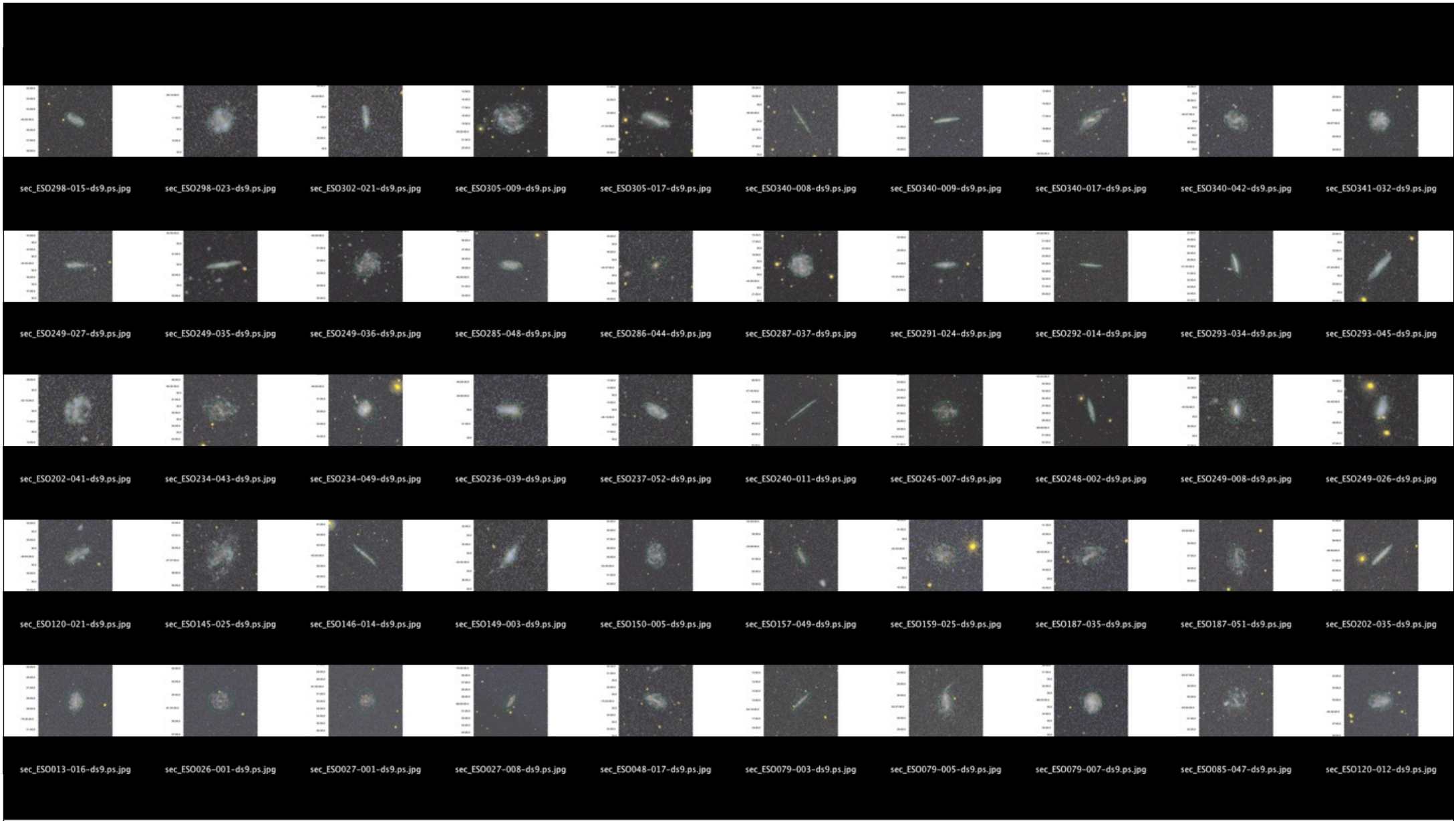
- We performed photometry on $\sim 1,530$ galaxies so far (more to come!)
- we obtained surface brightness and color profiles in the FUV and NUV, as well as asymptotic magnitudes.

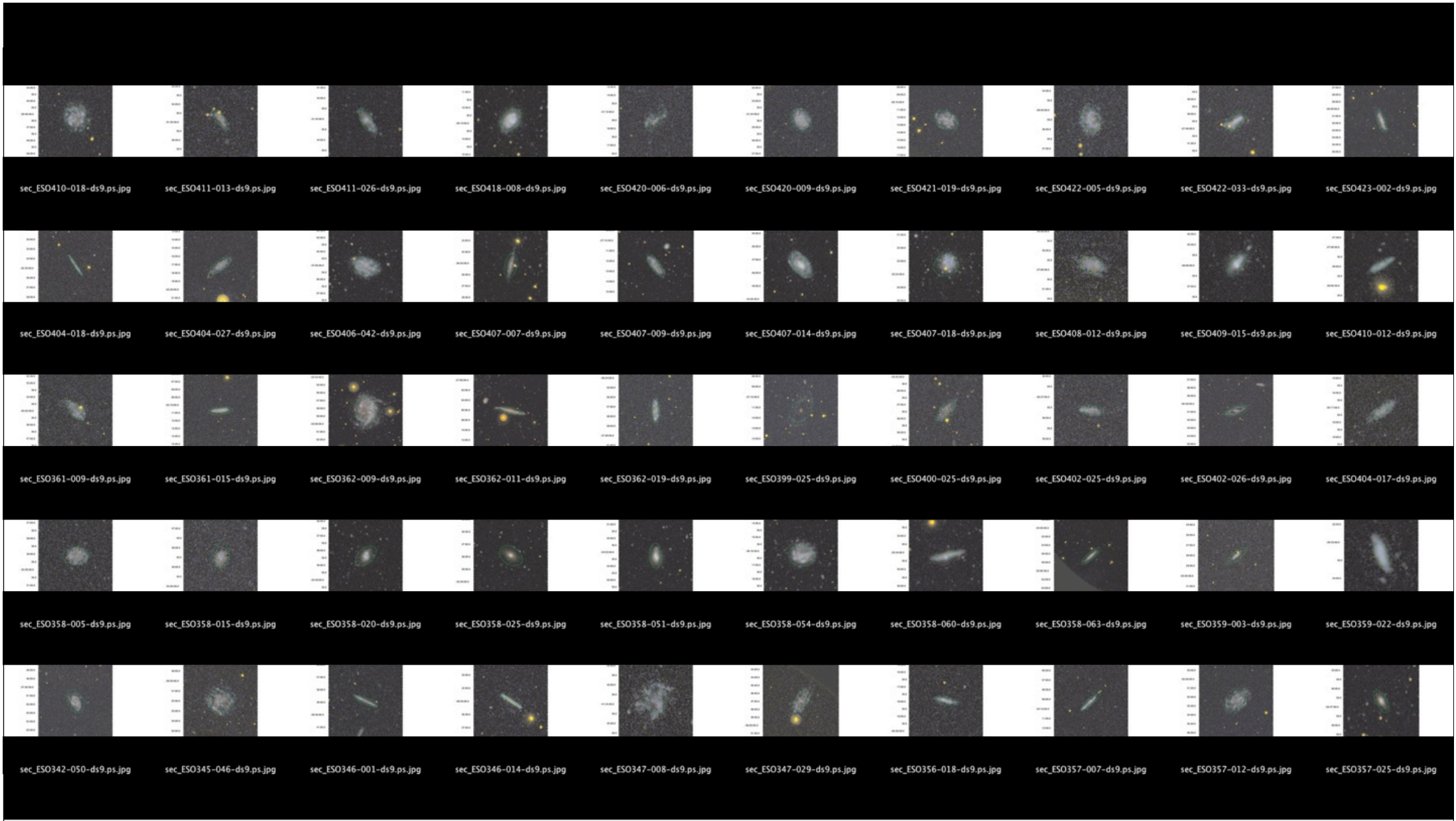


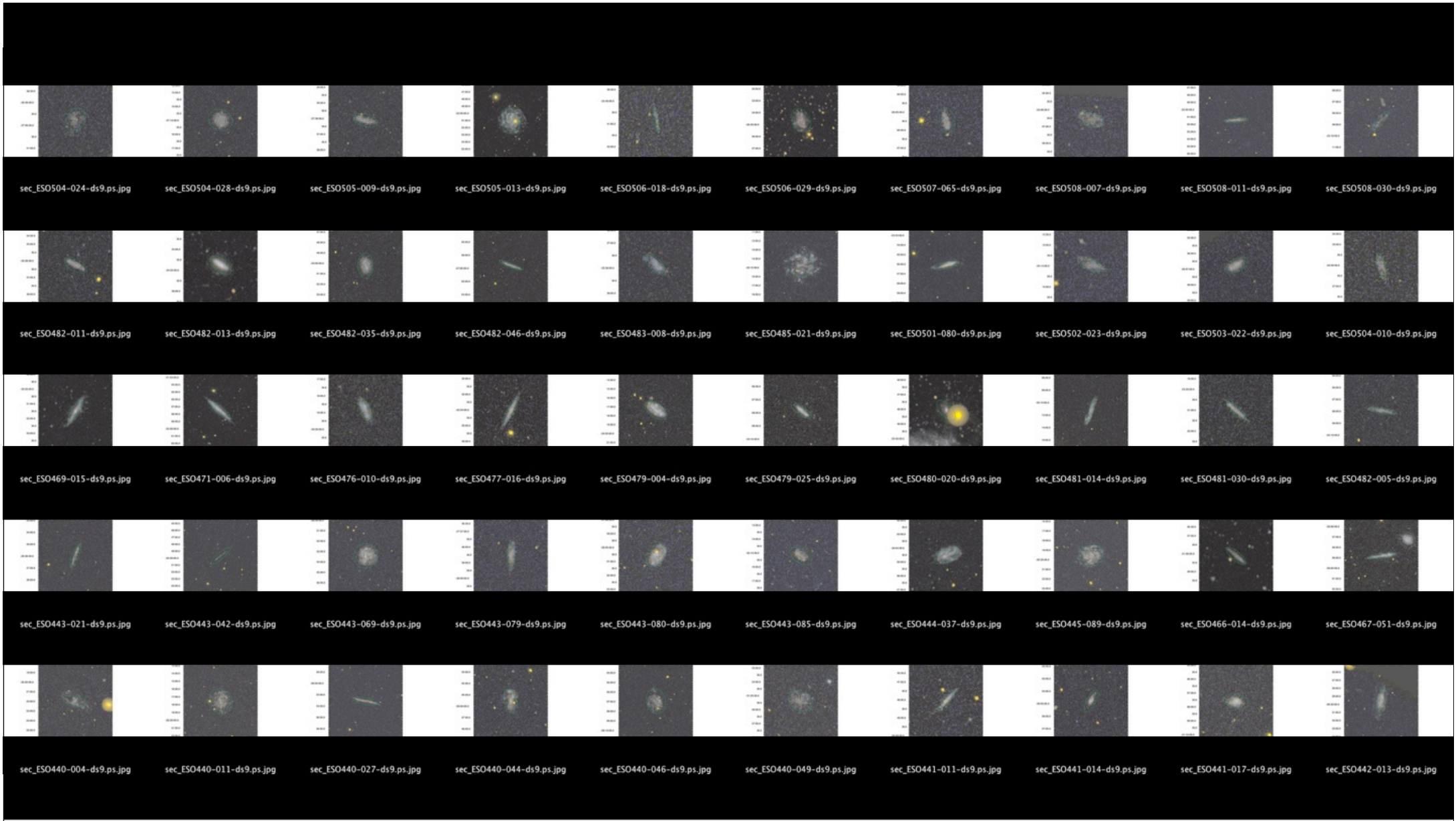


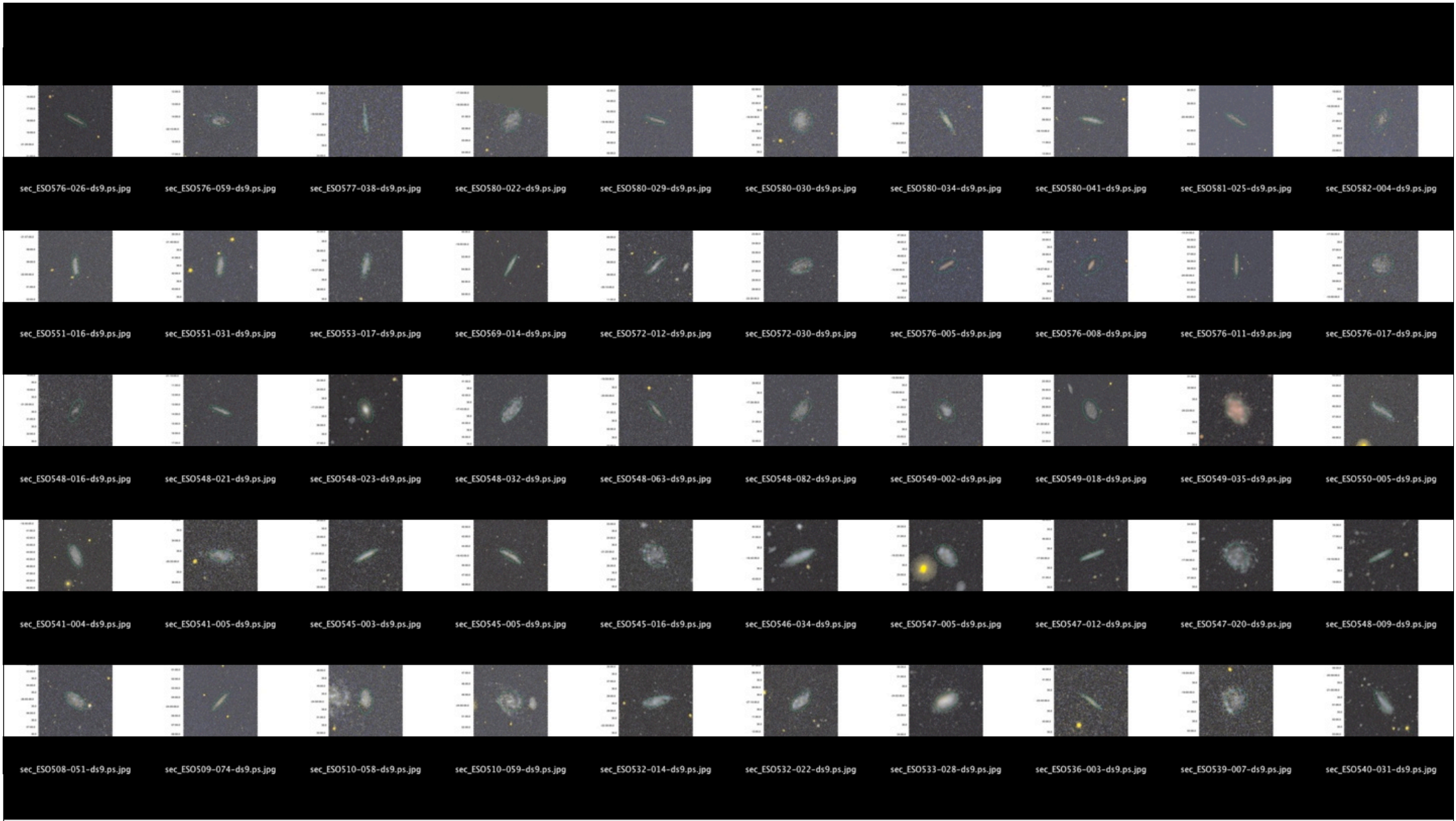
Color Image Generation

- An RGB image was also created using FUV and NUV bands imaging, with FUV as B, FUV+NUV as G and NUV as R

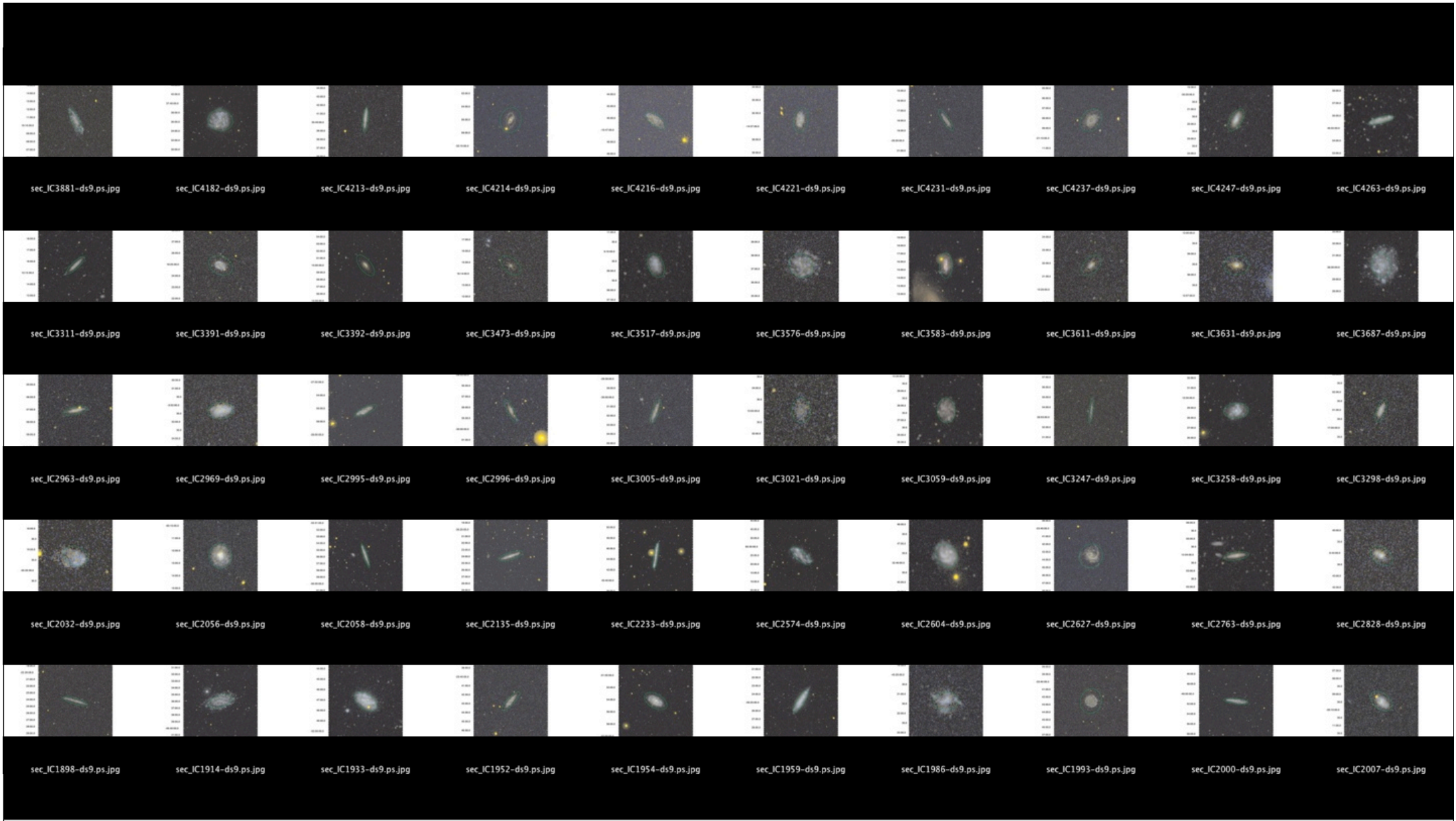


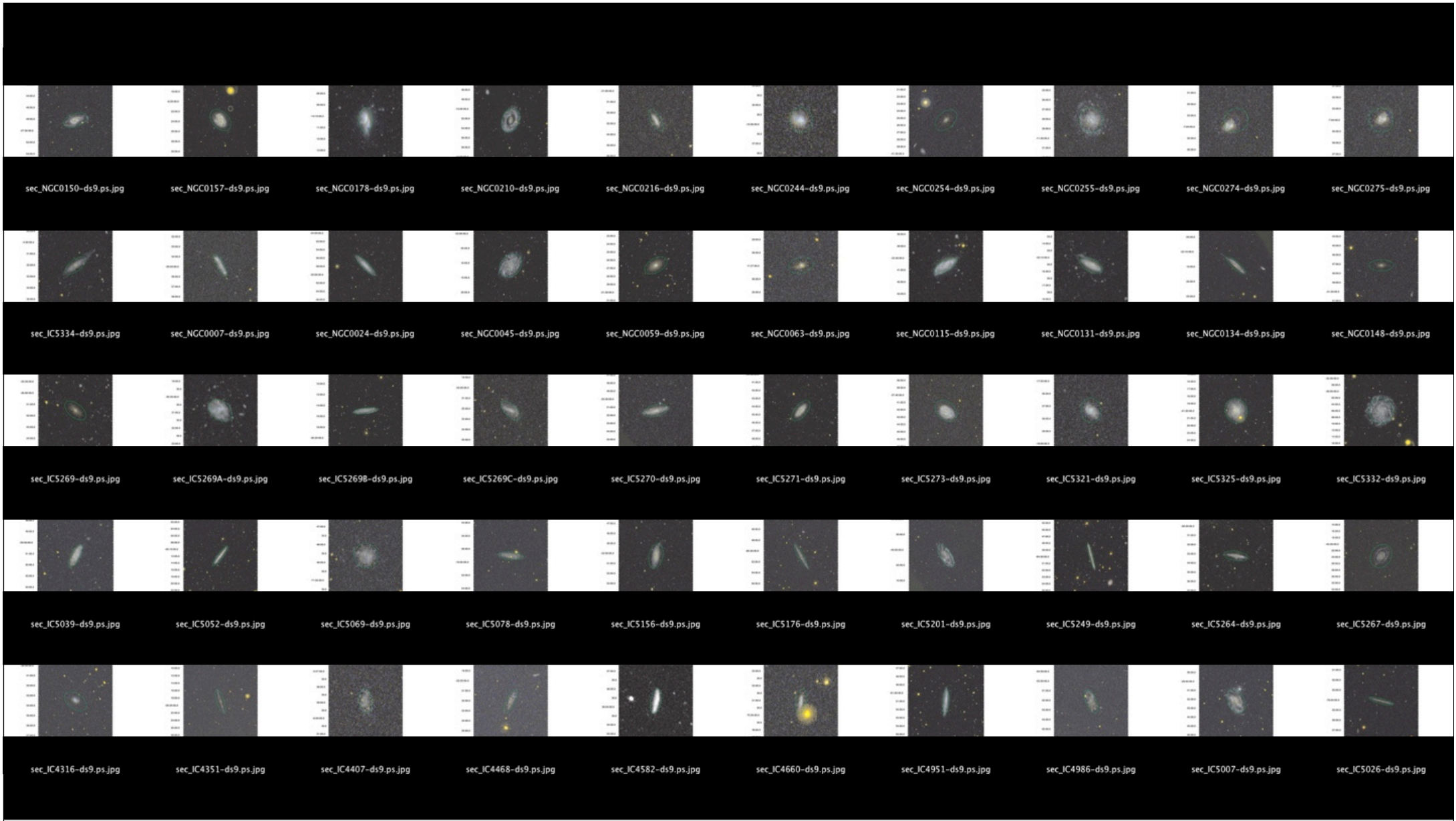


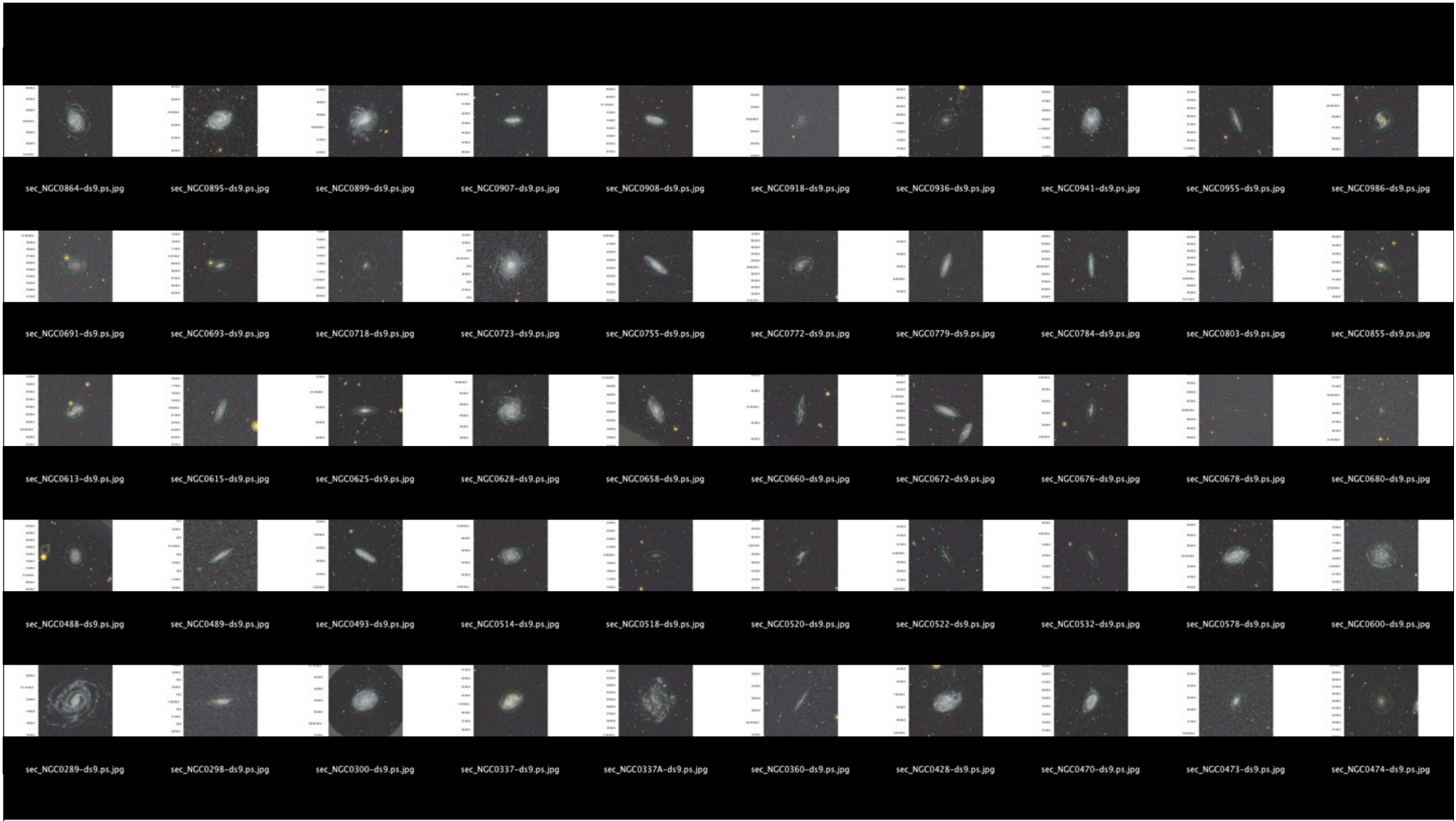


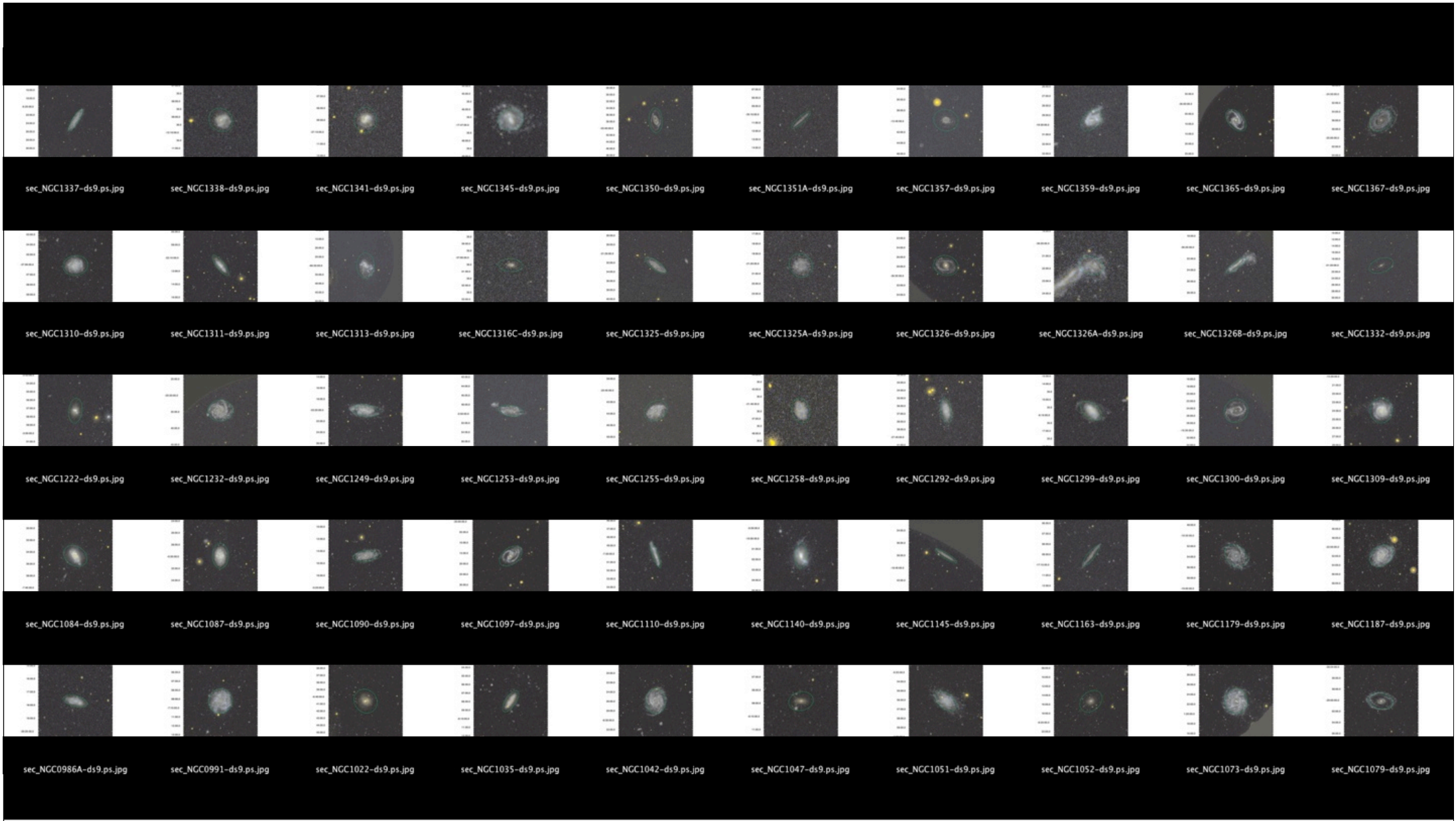


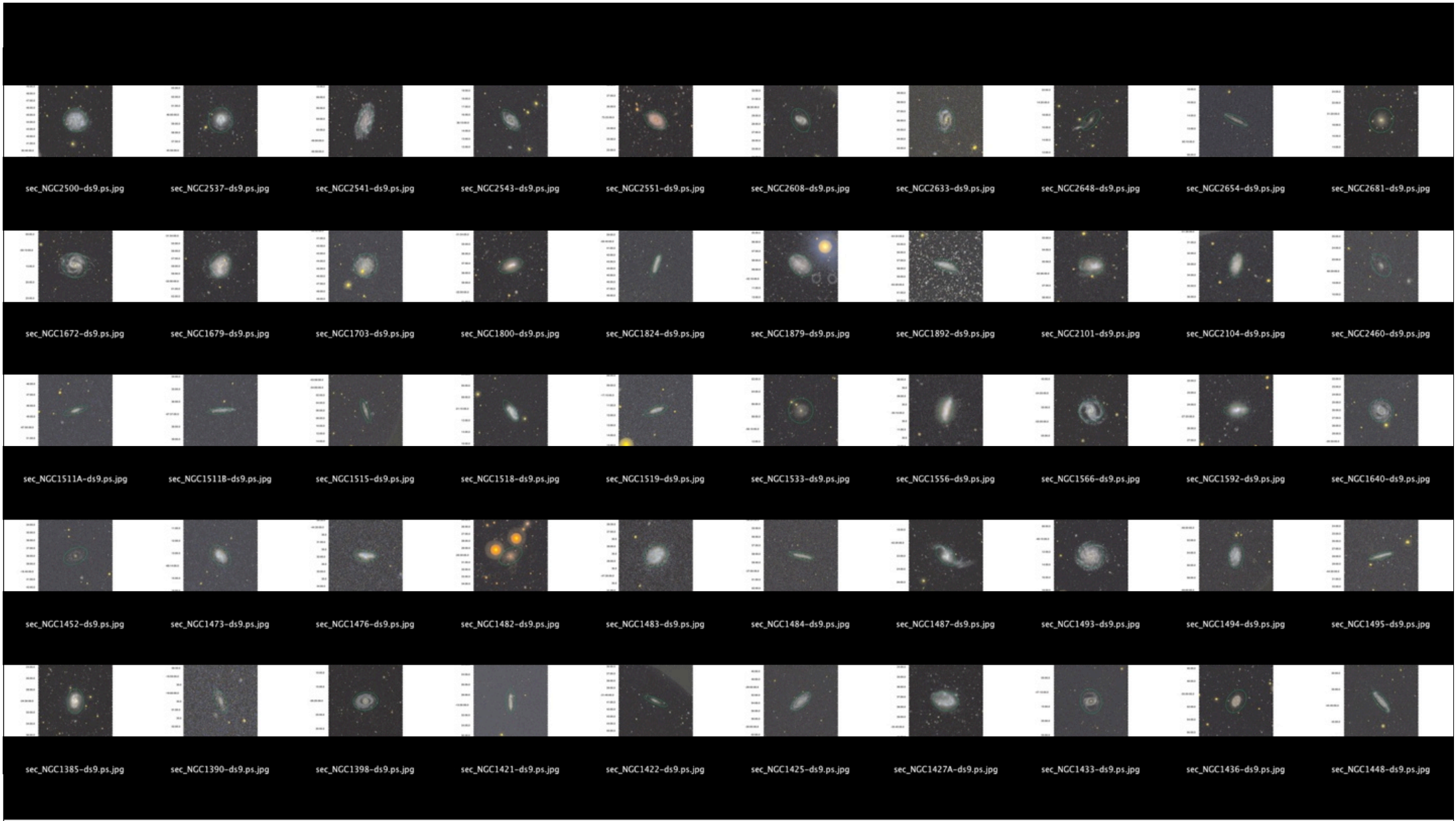


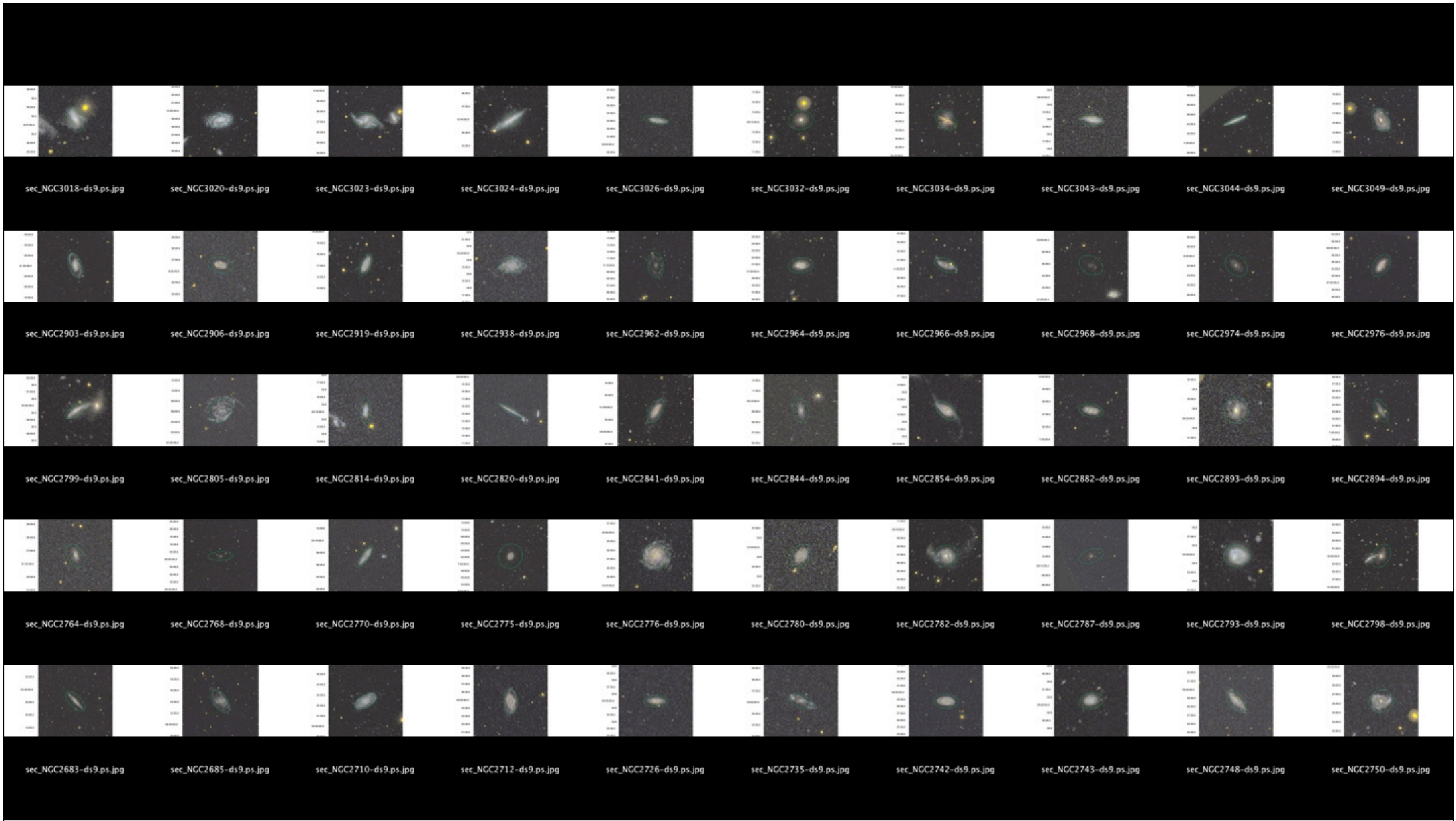


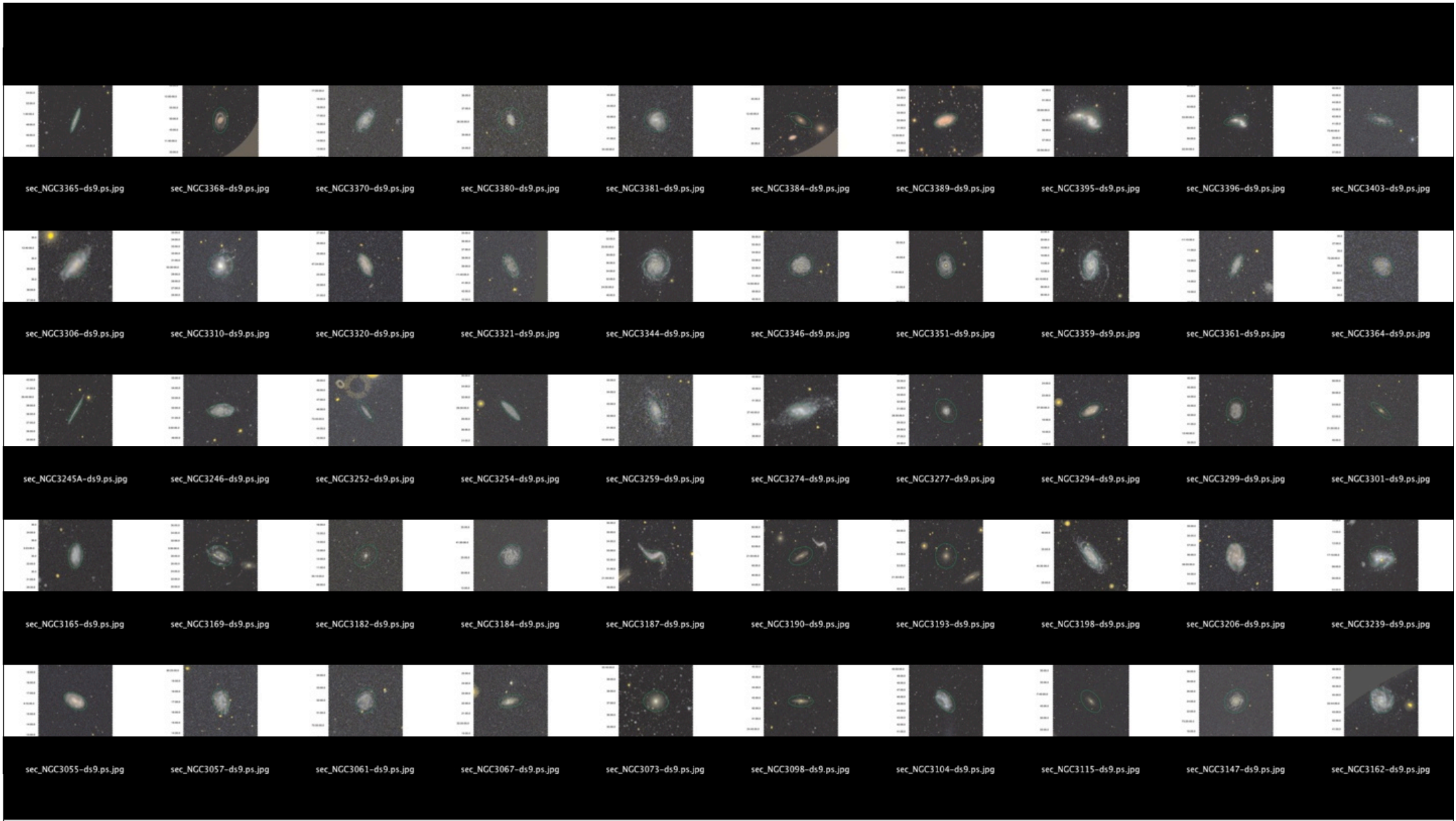












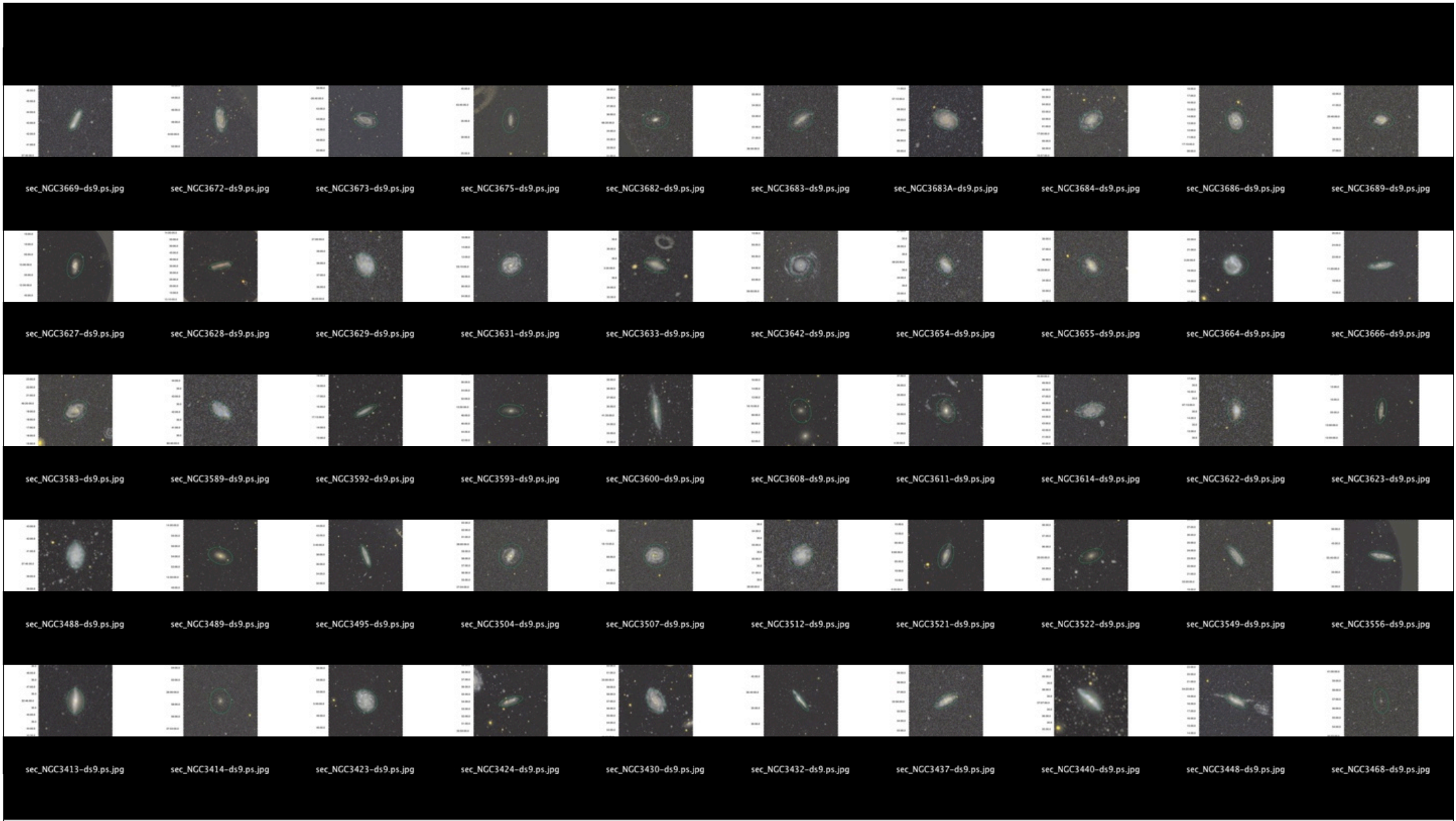
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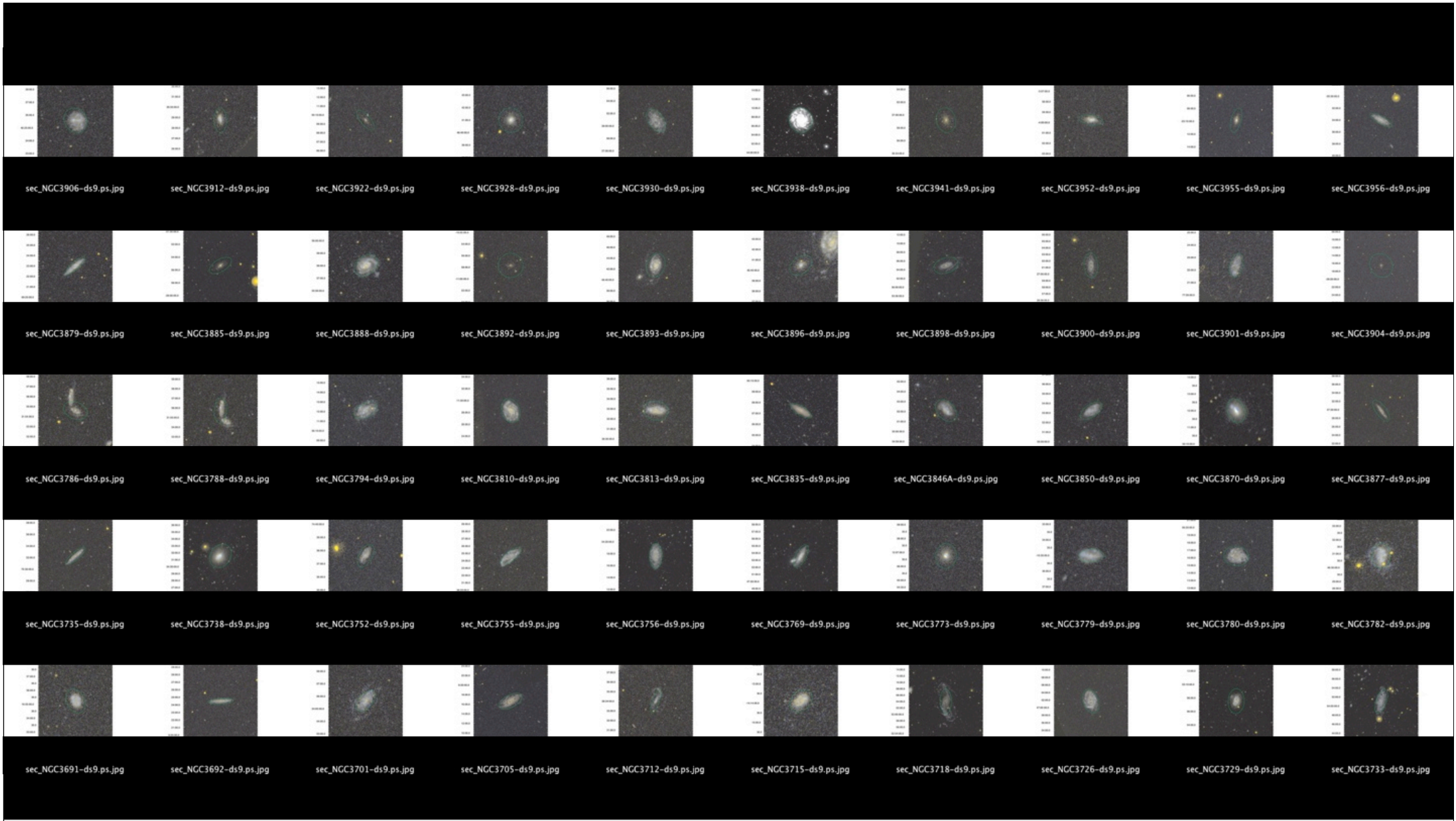
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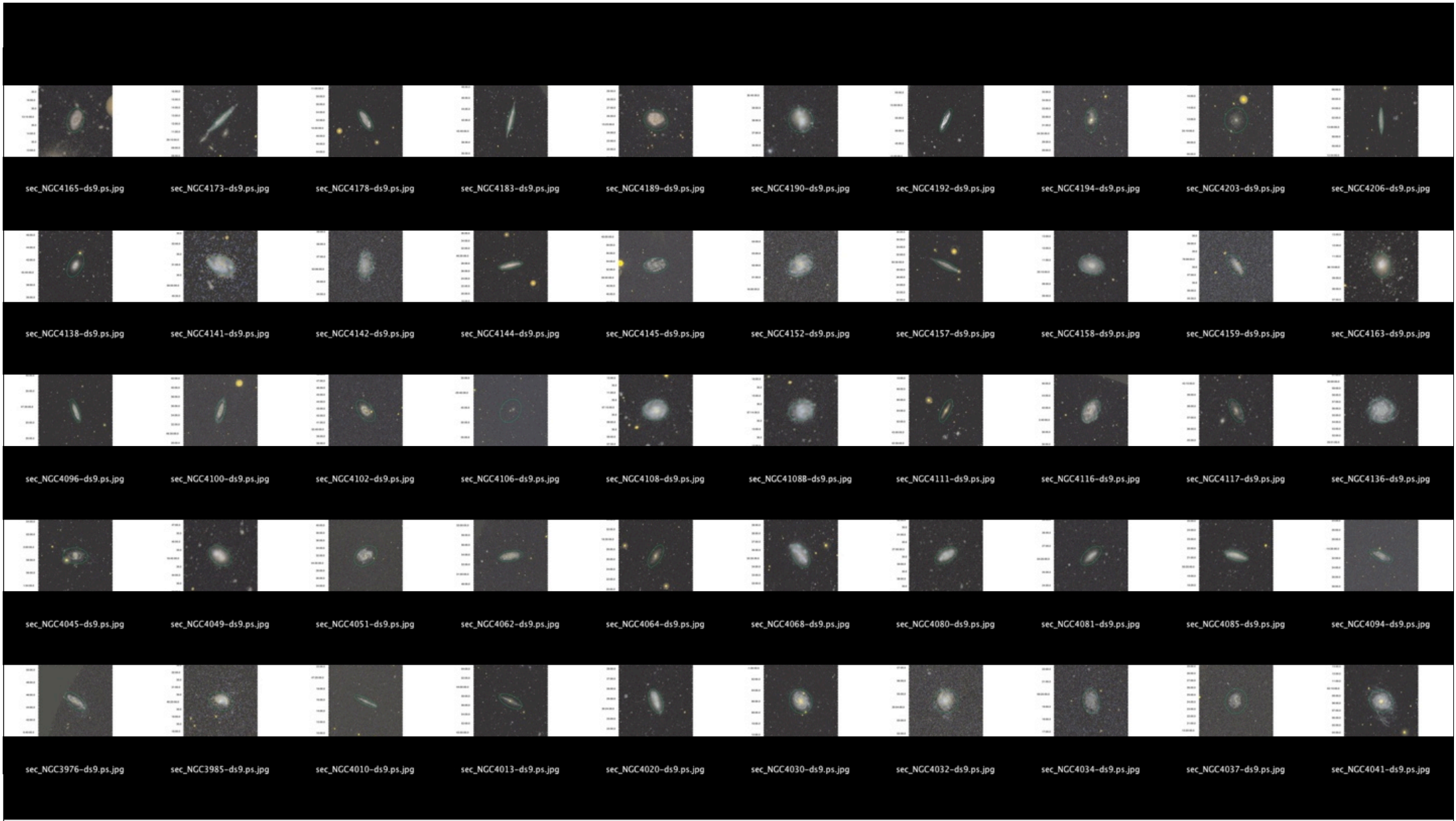
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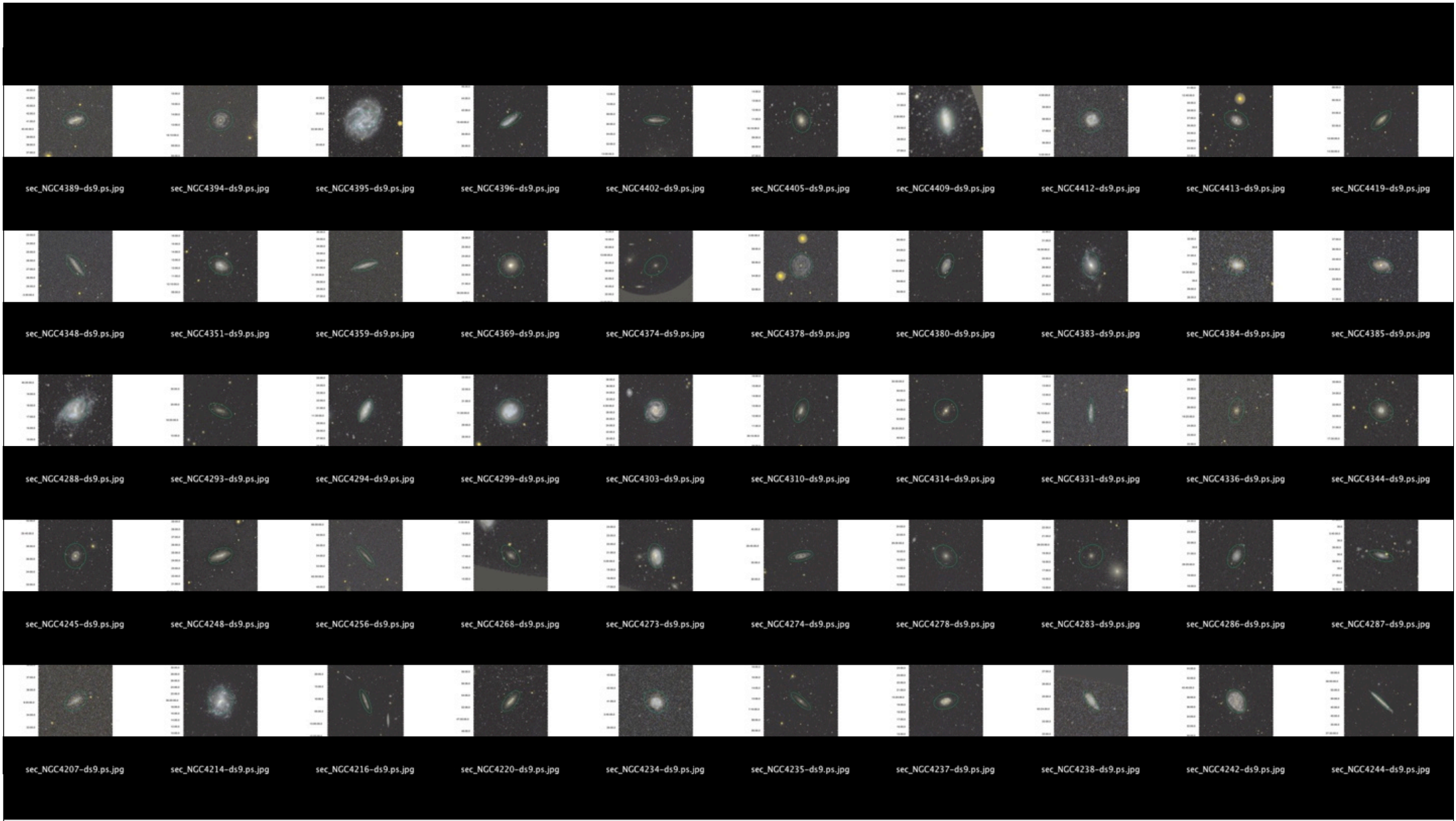
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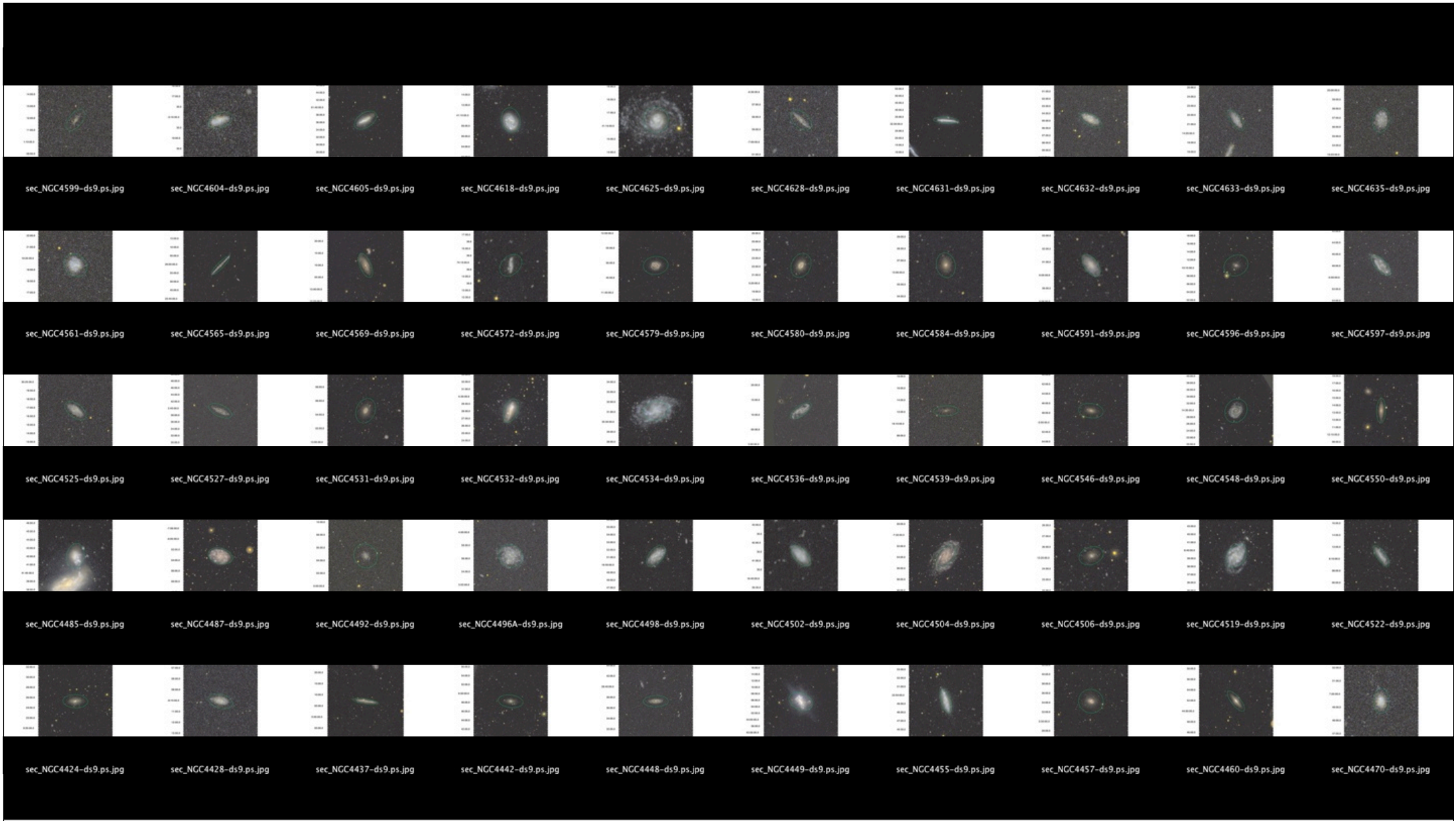
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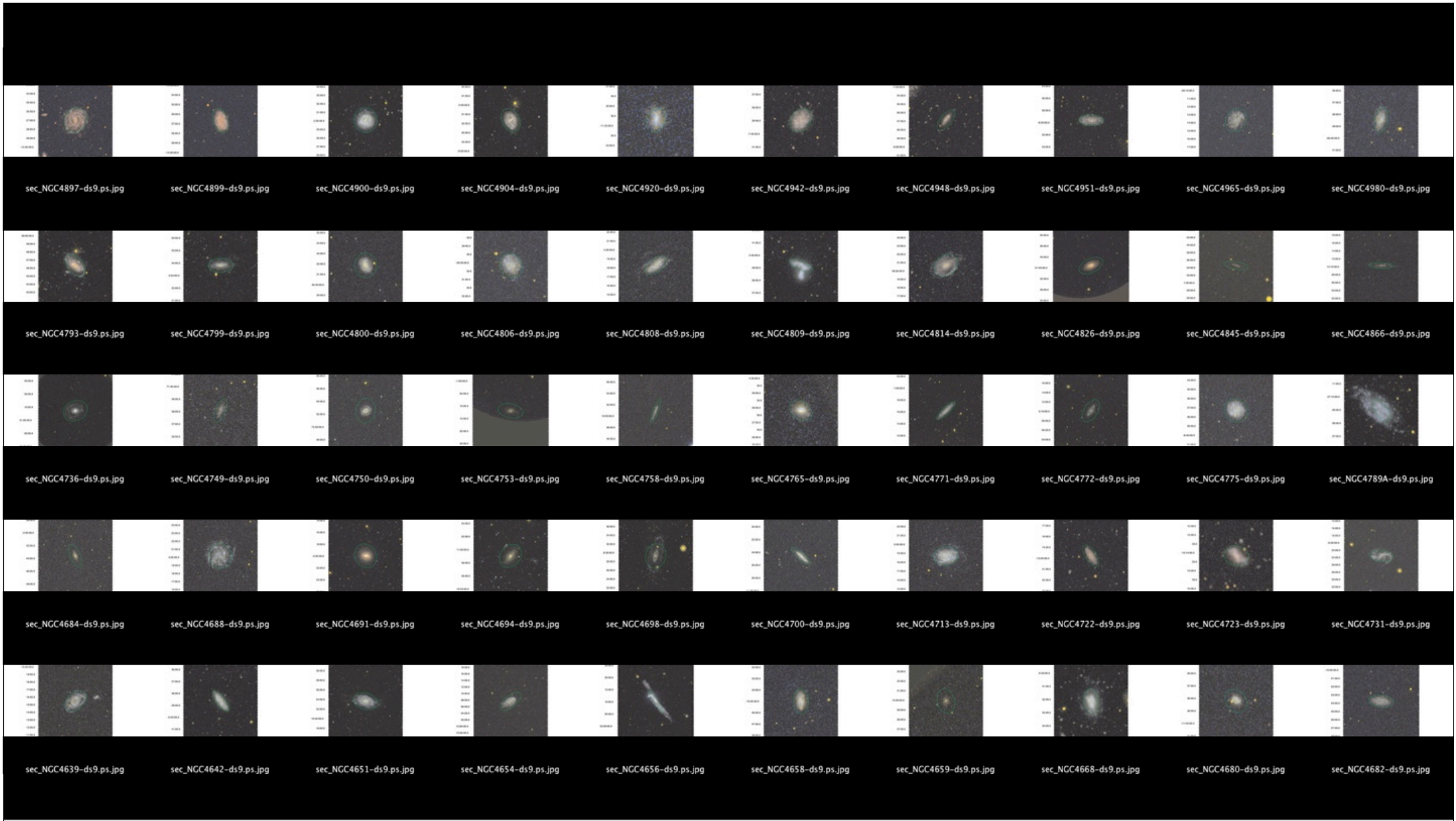


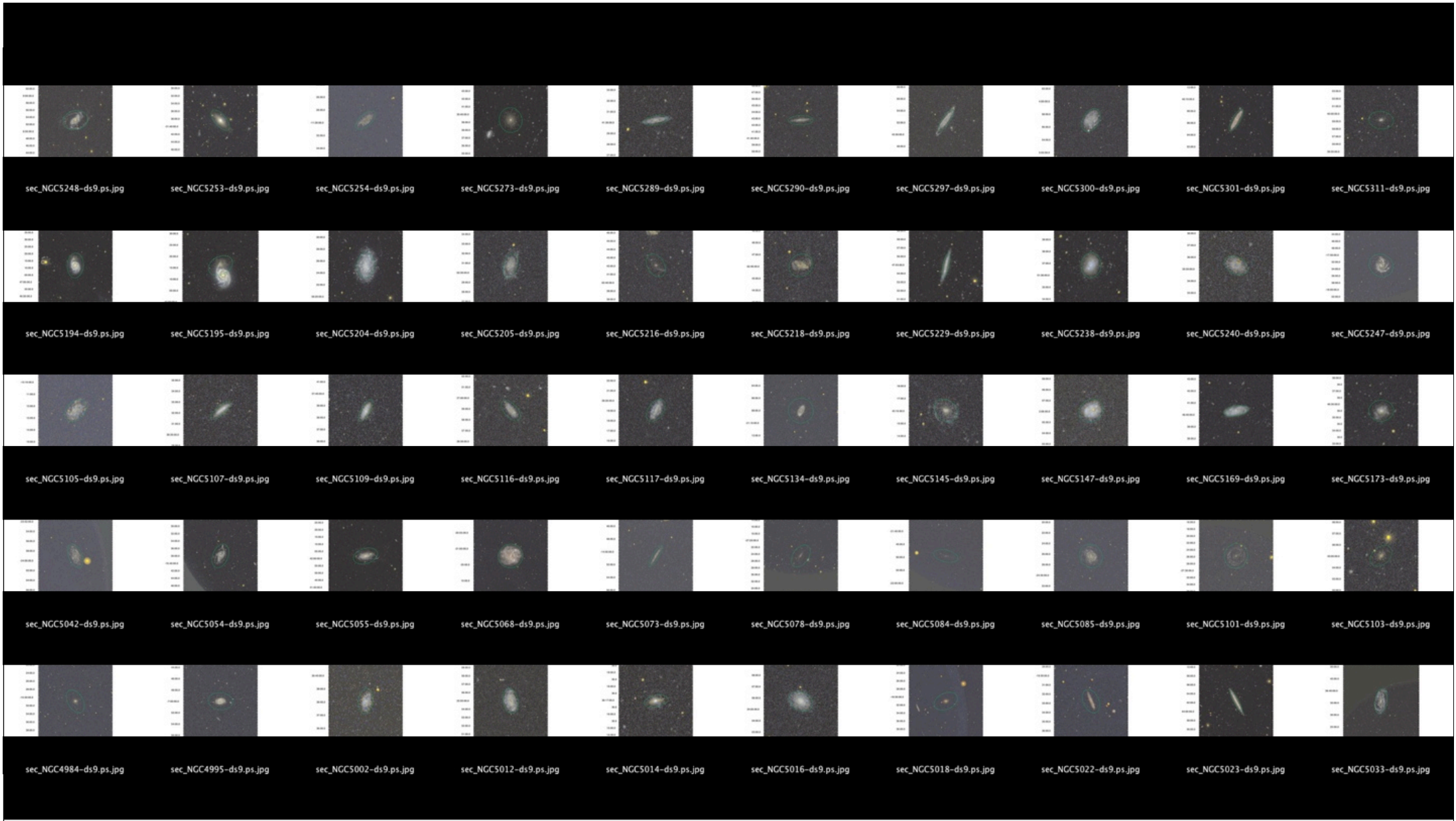


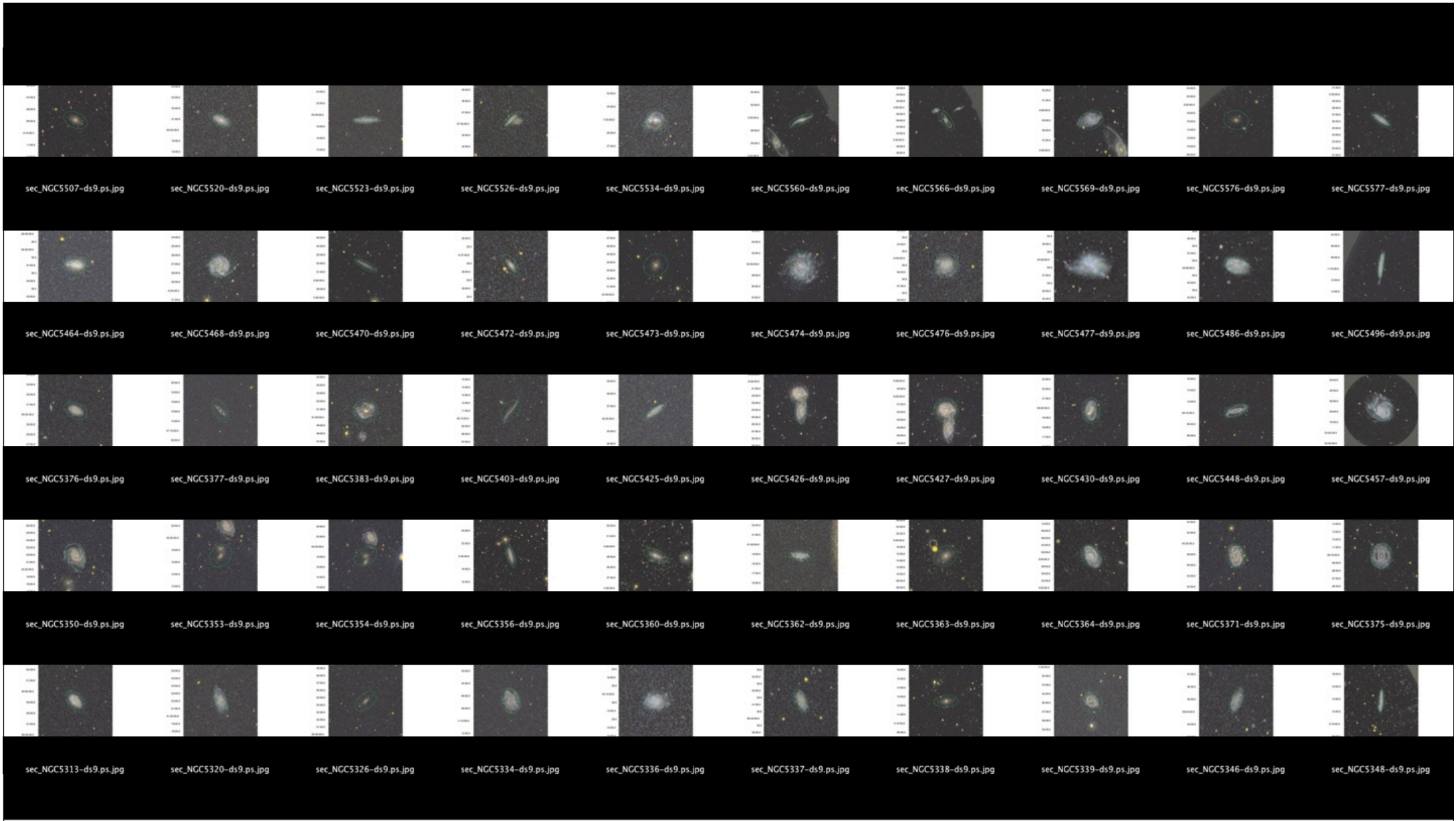


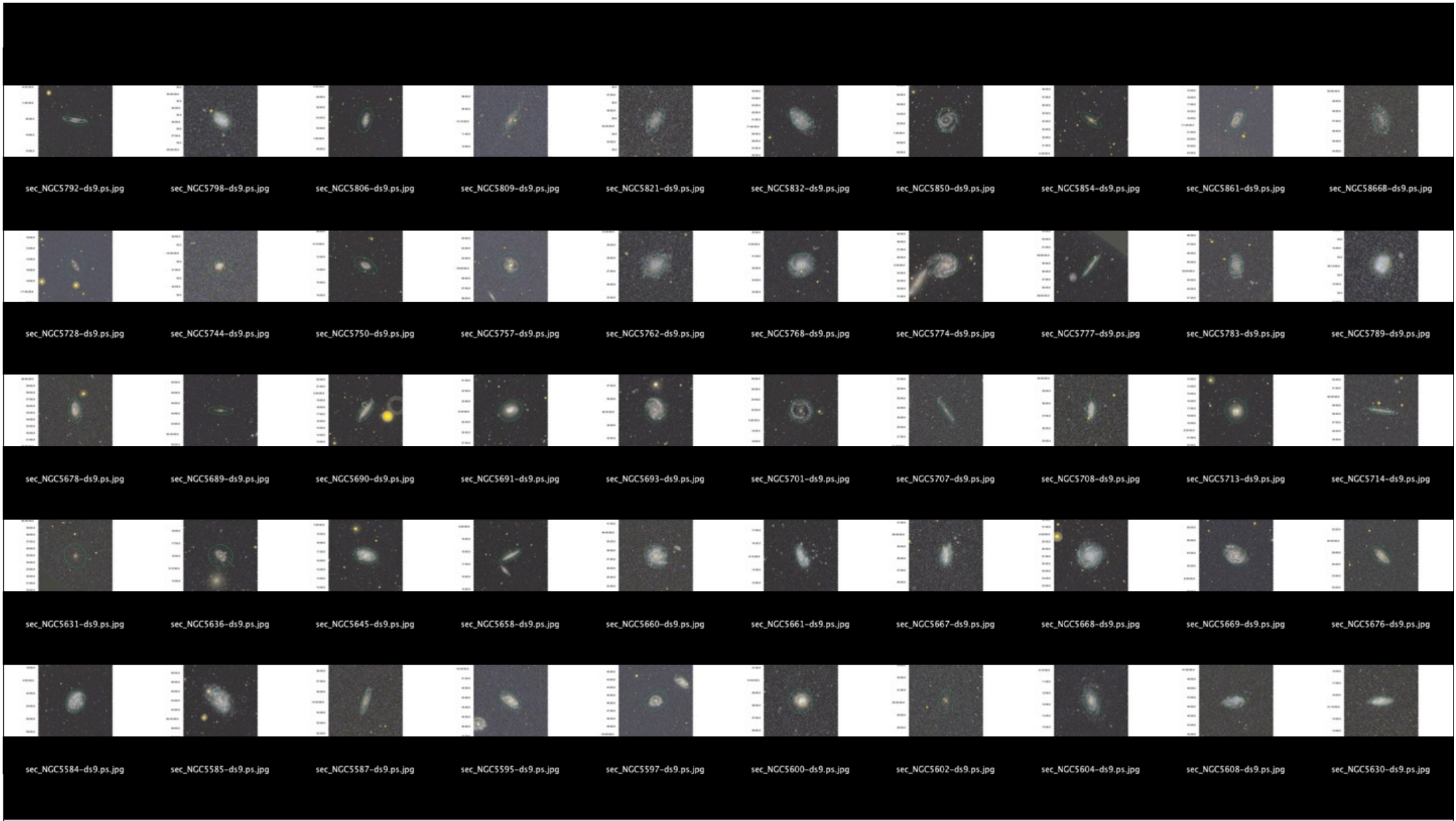


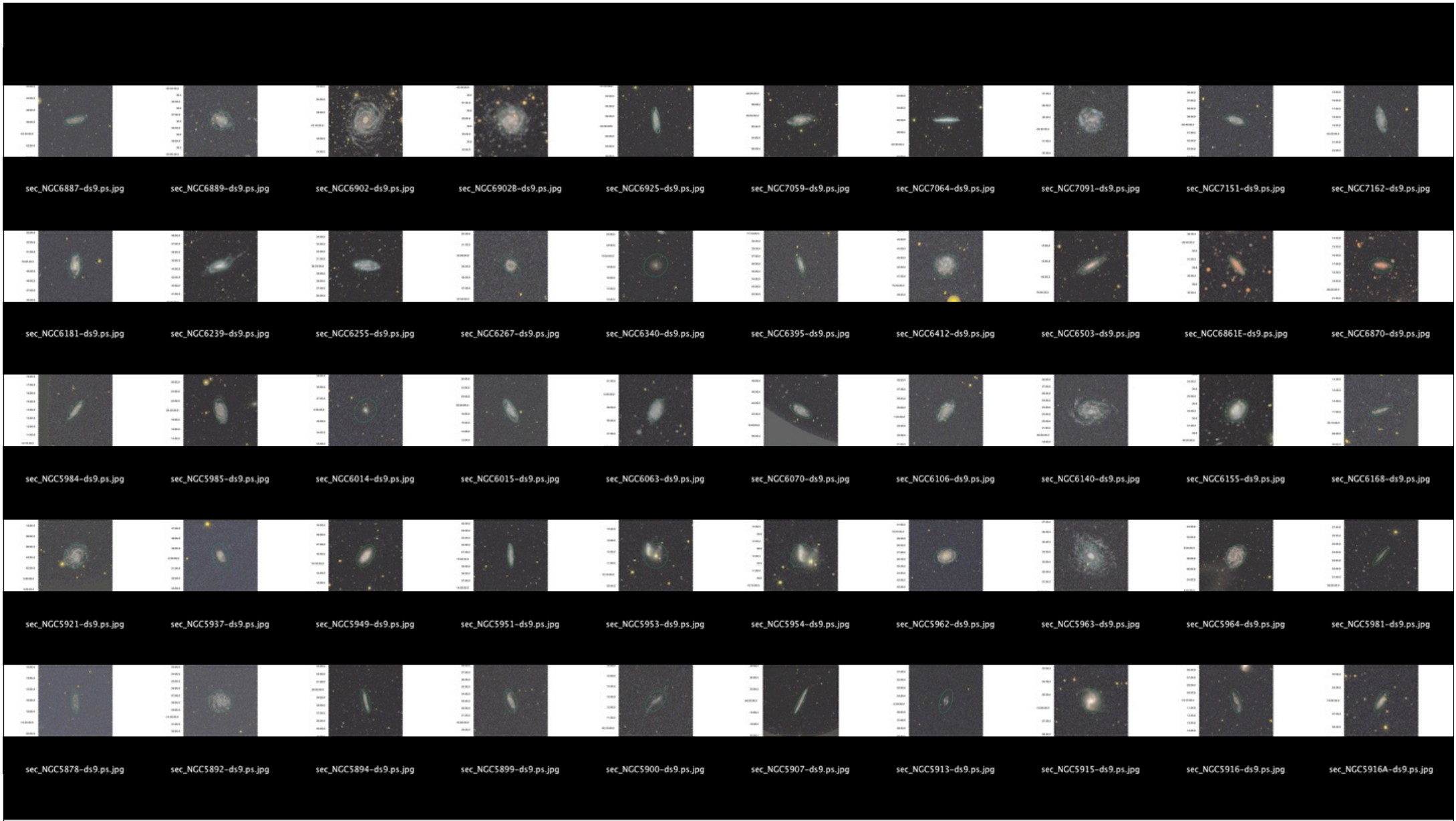


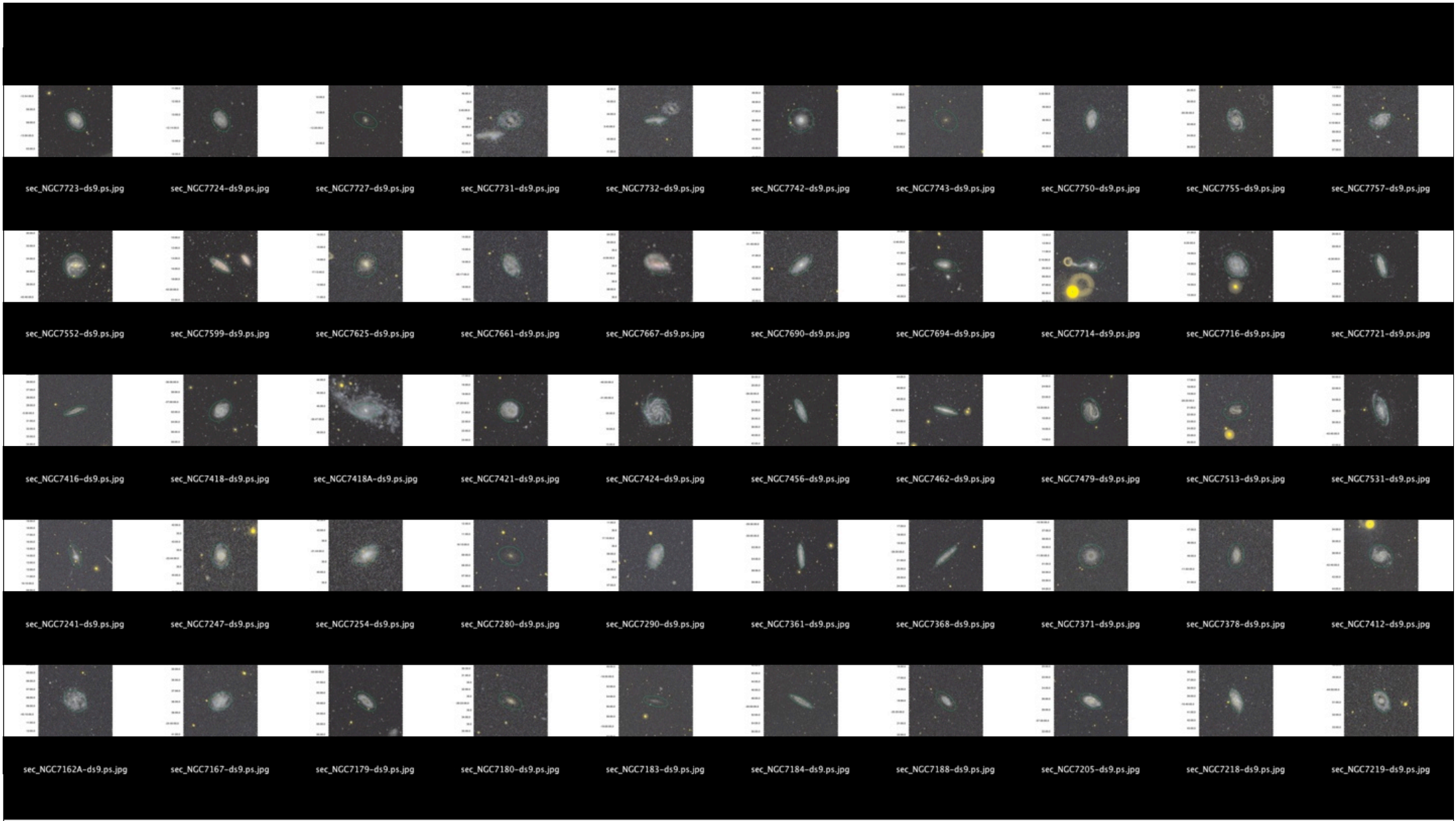


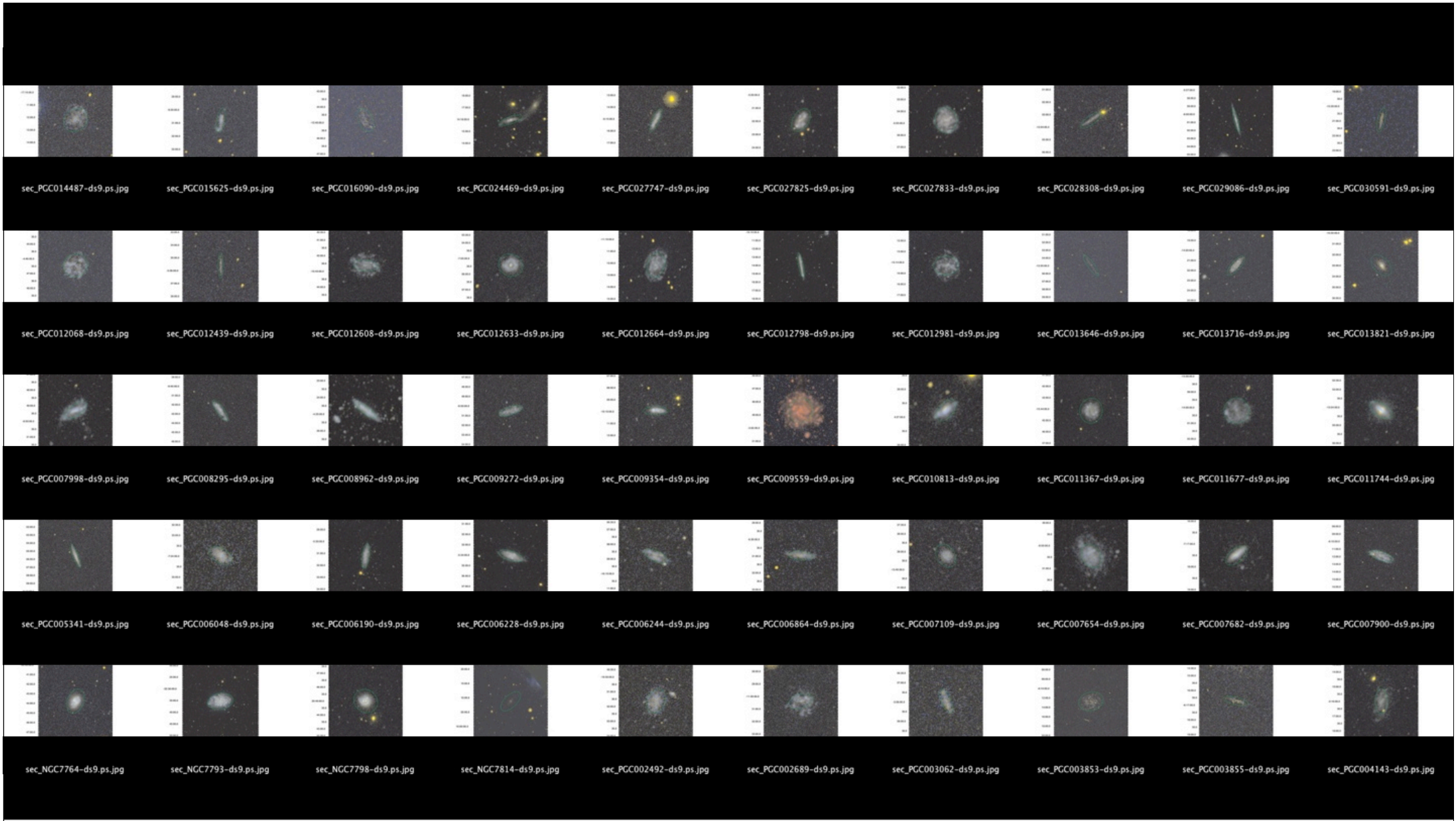


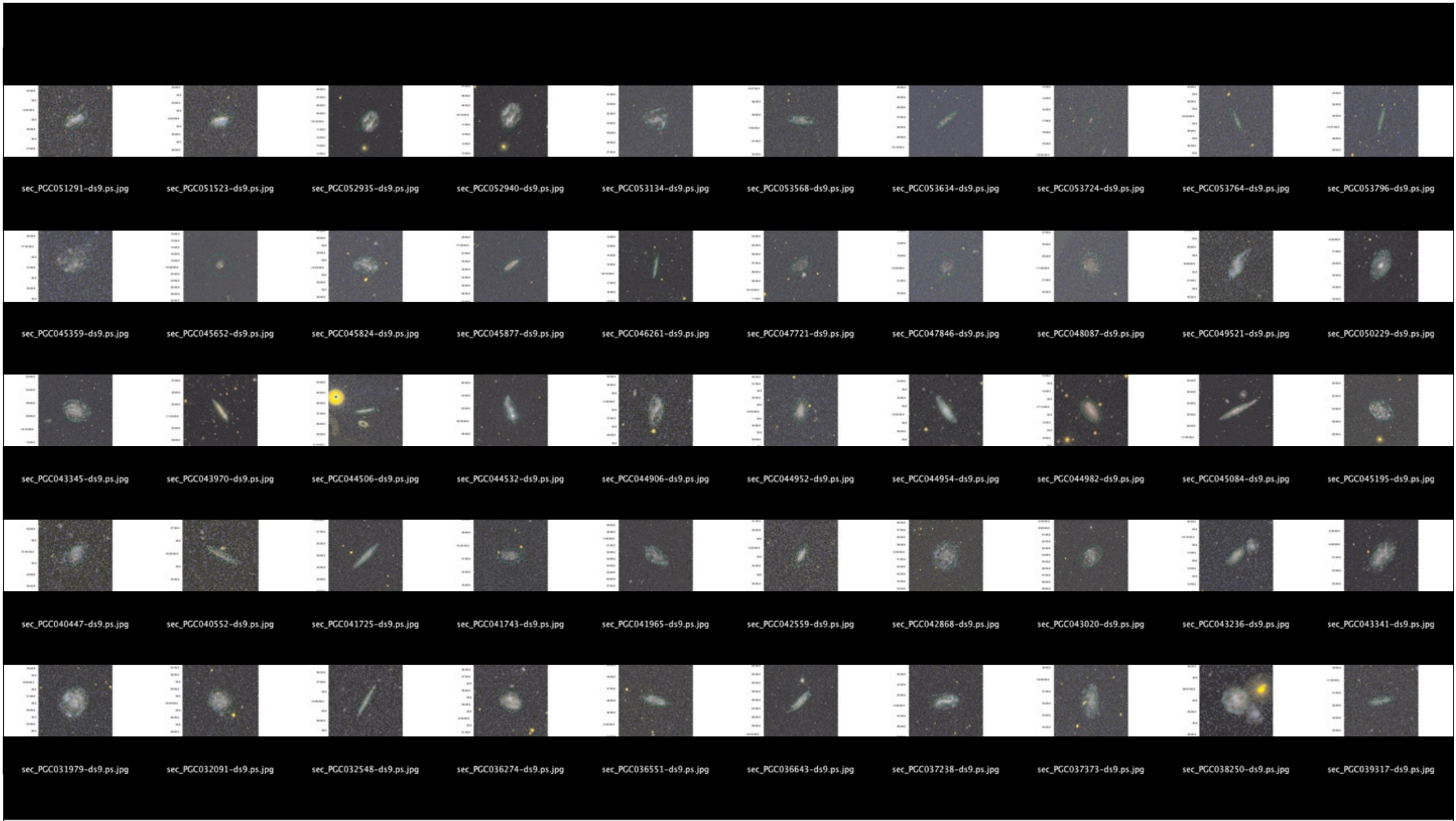












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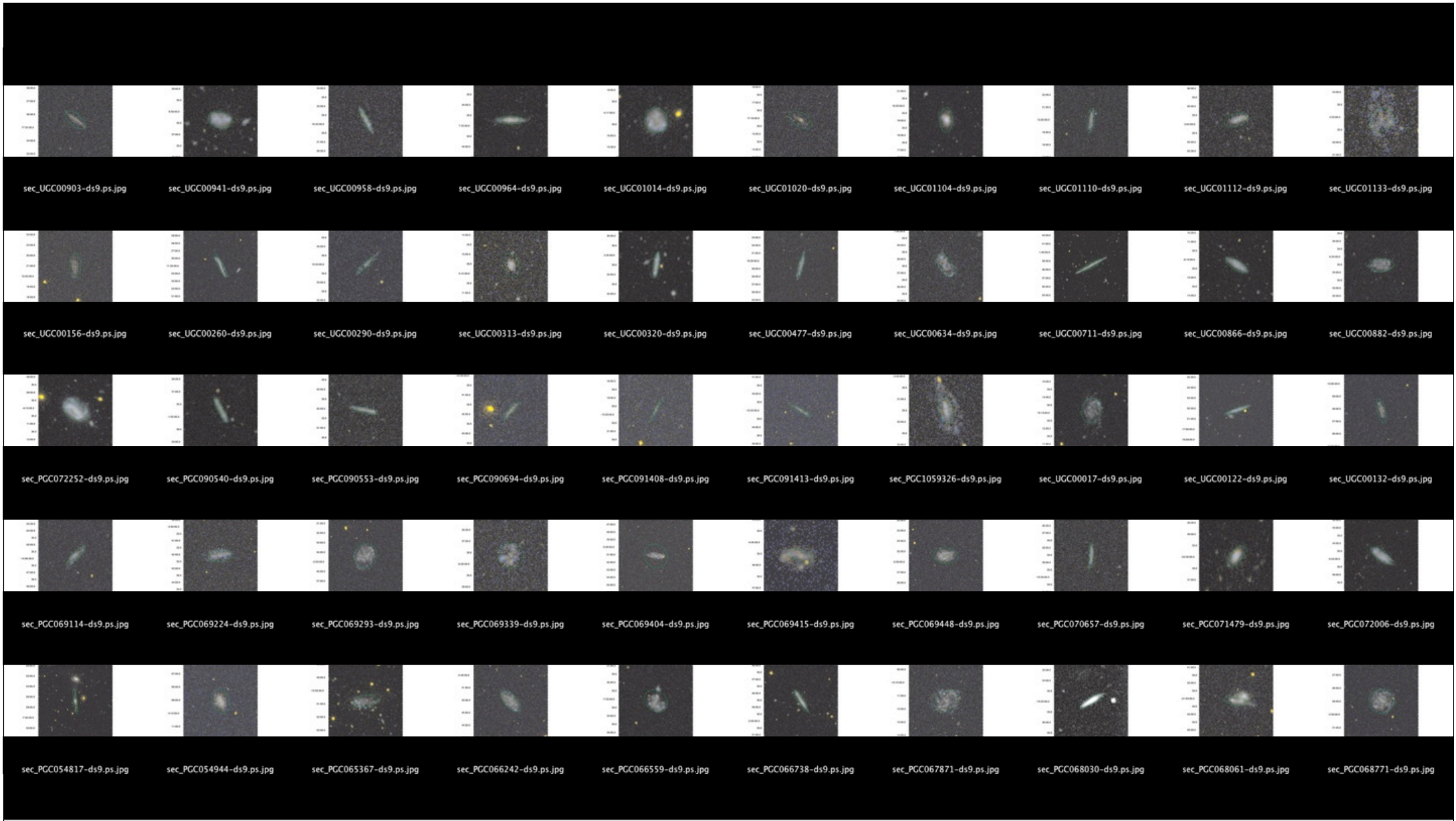
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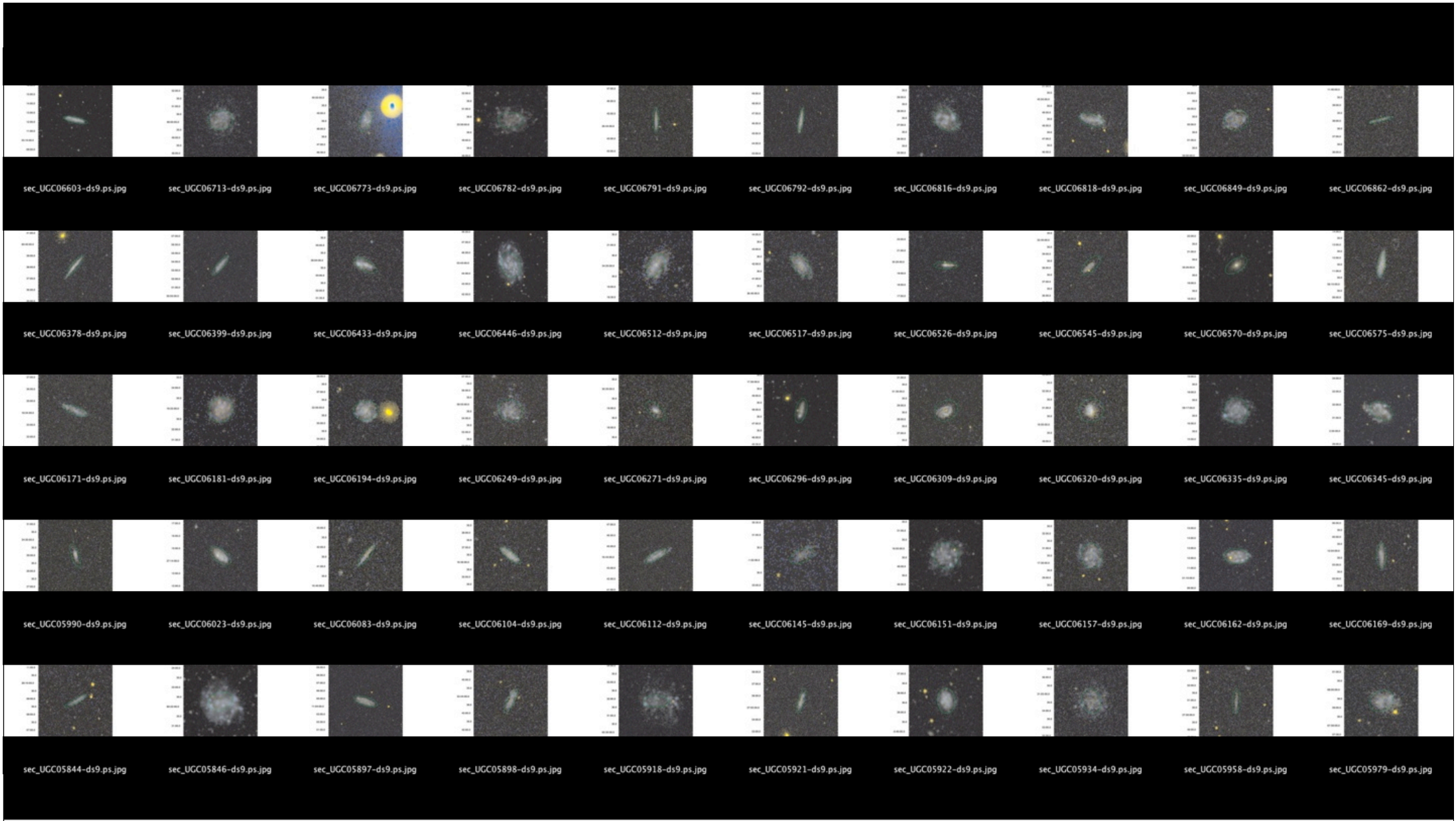
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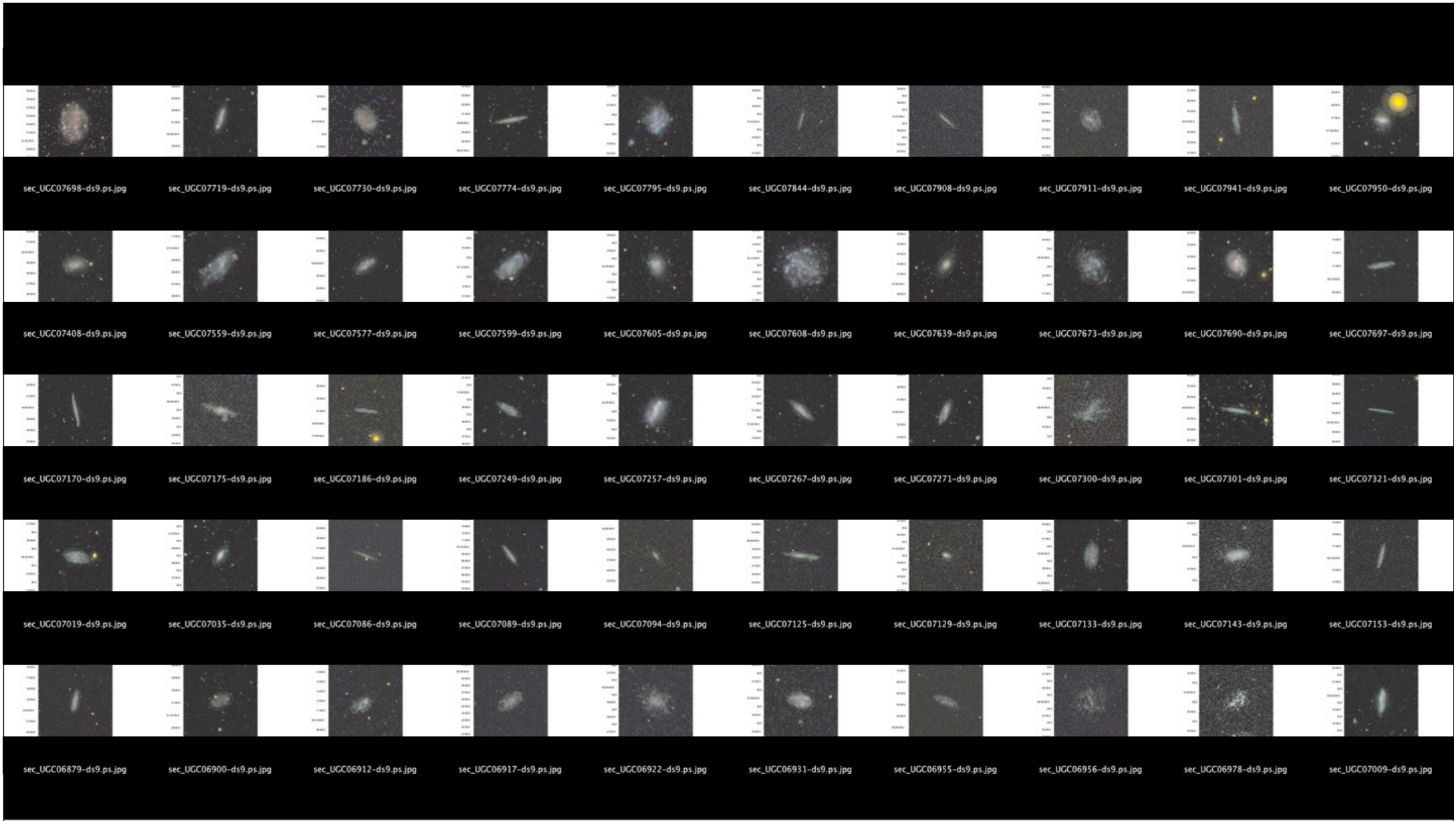
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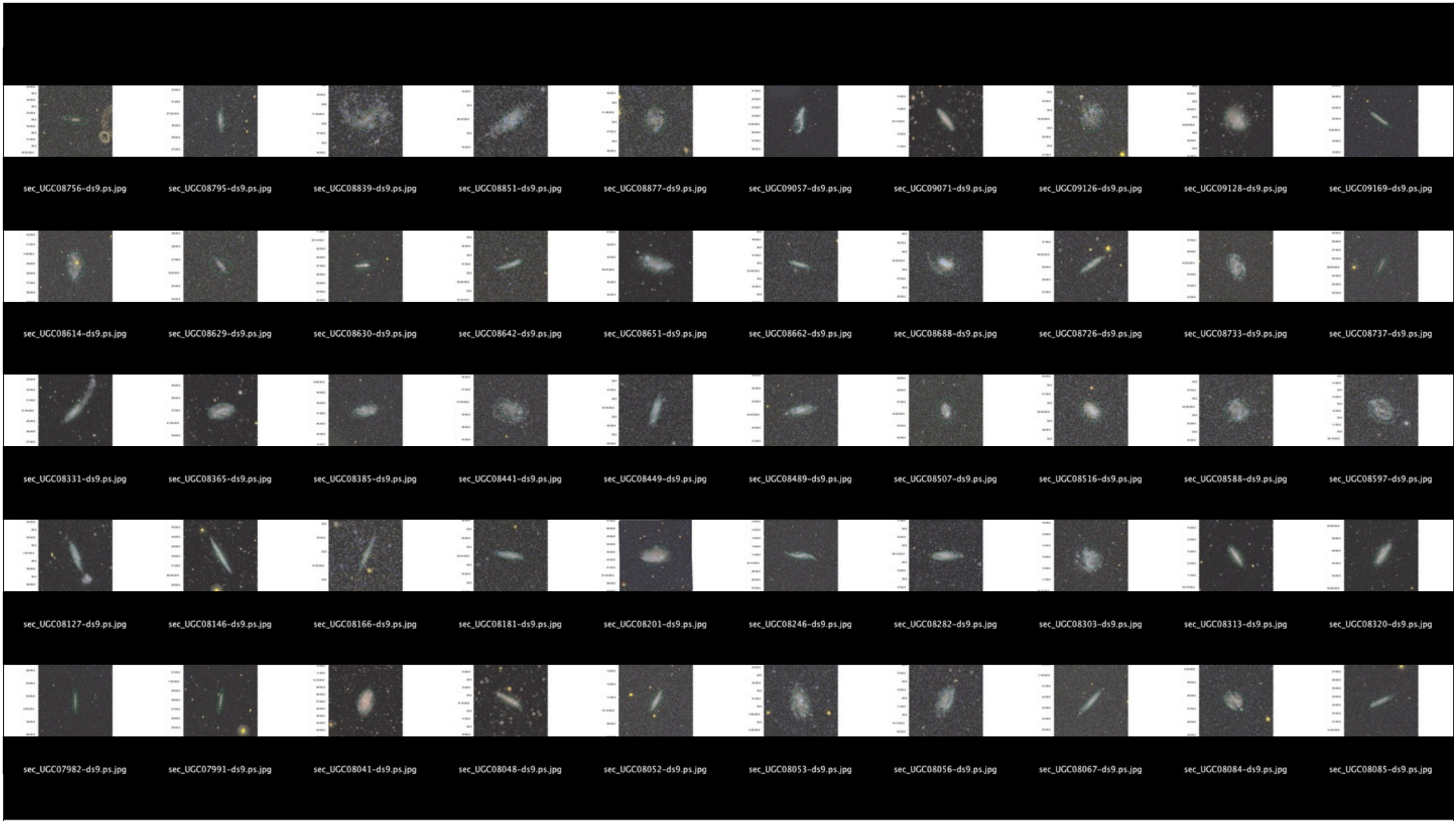


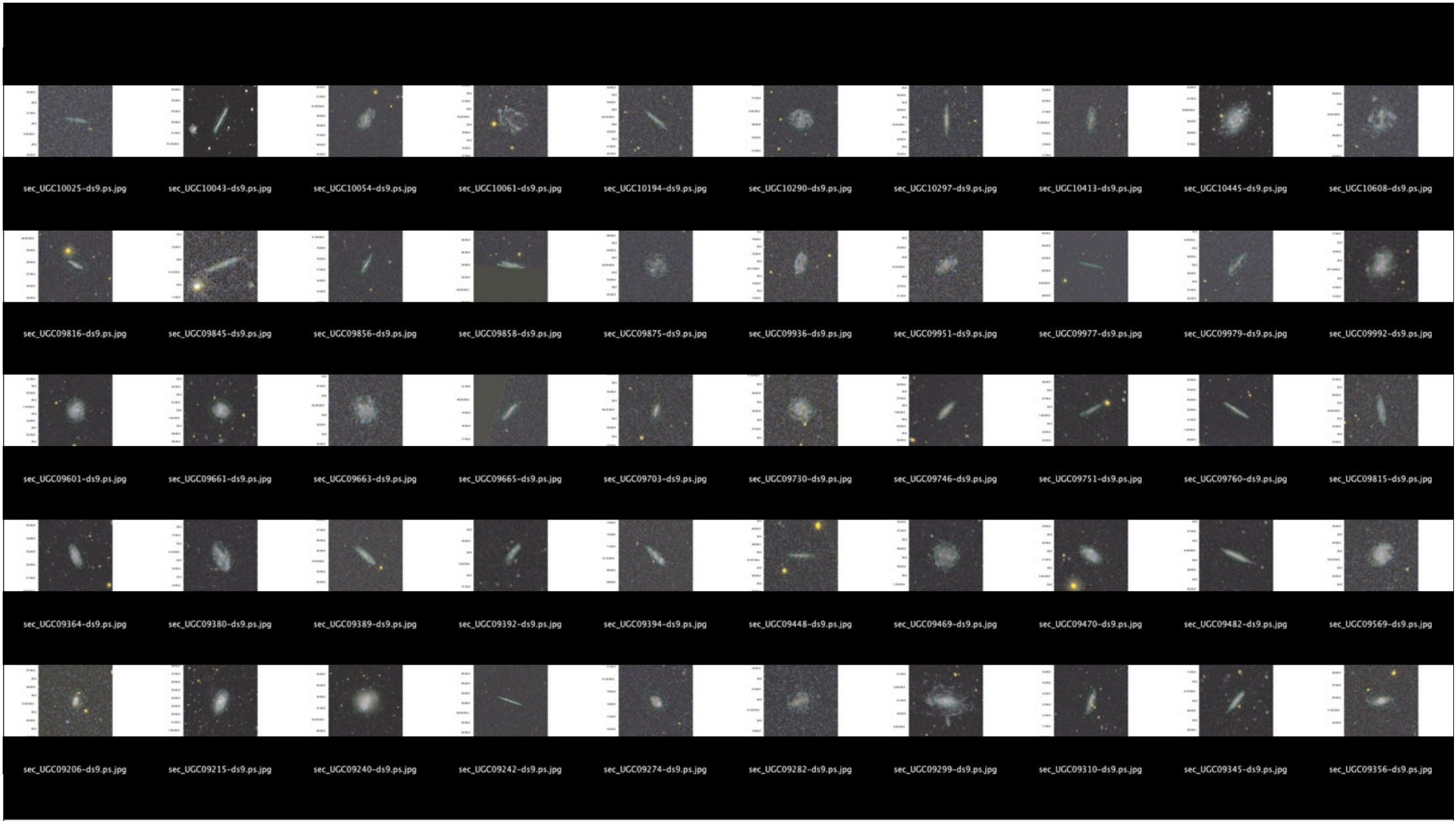


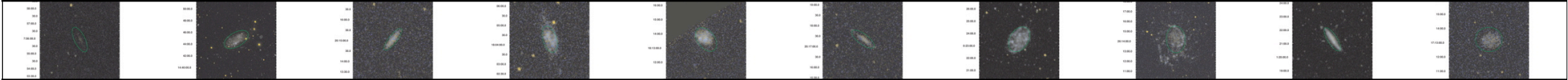
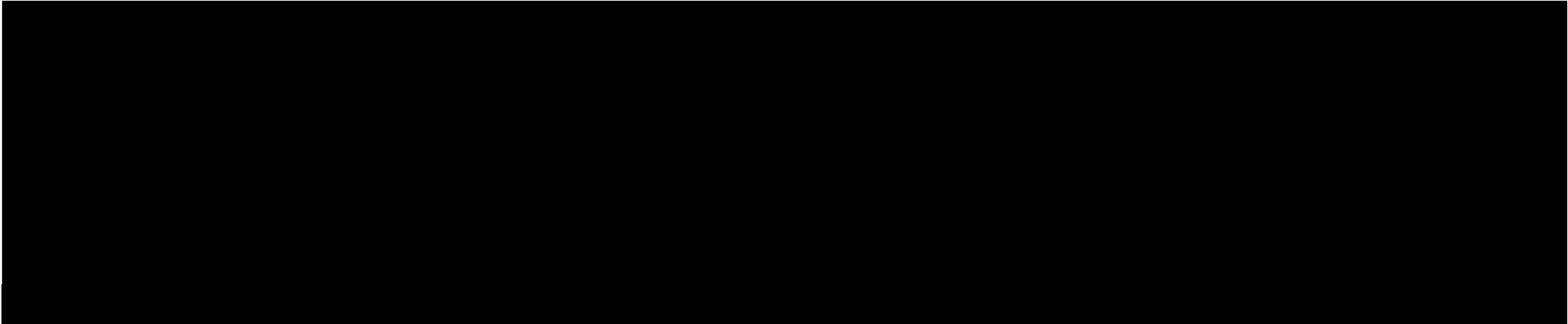








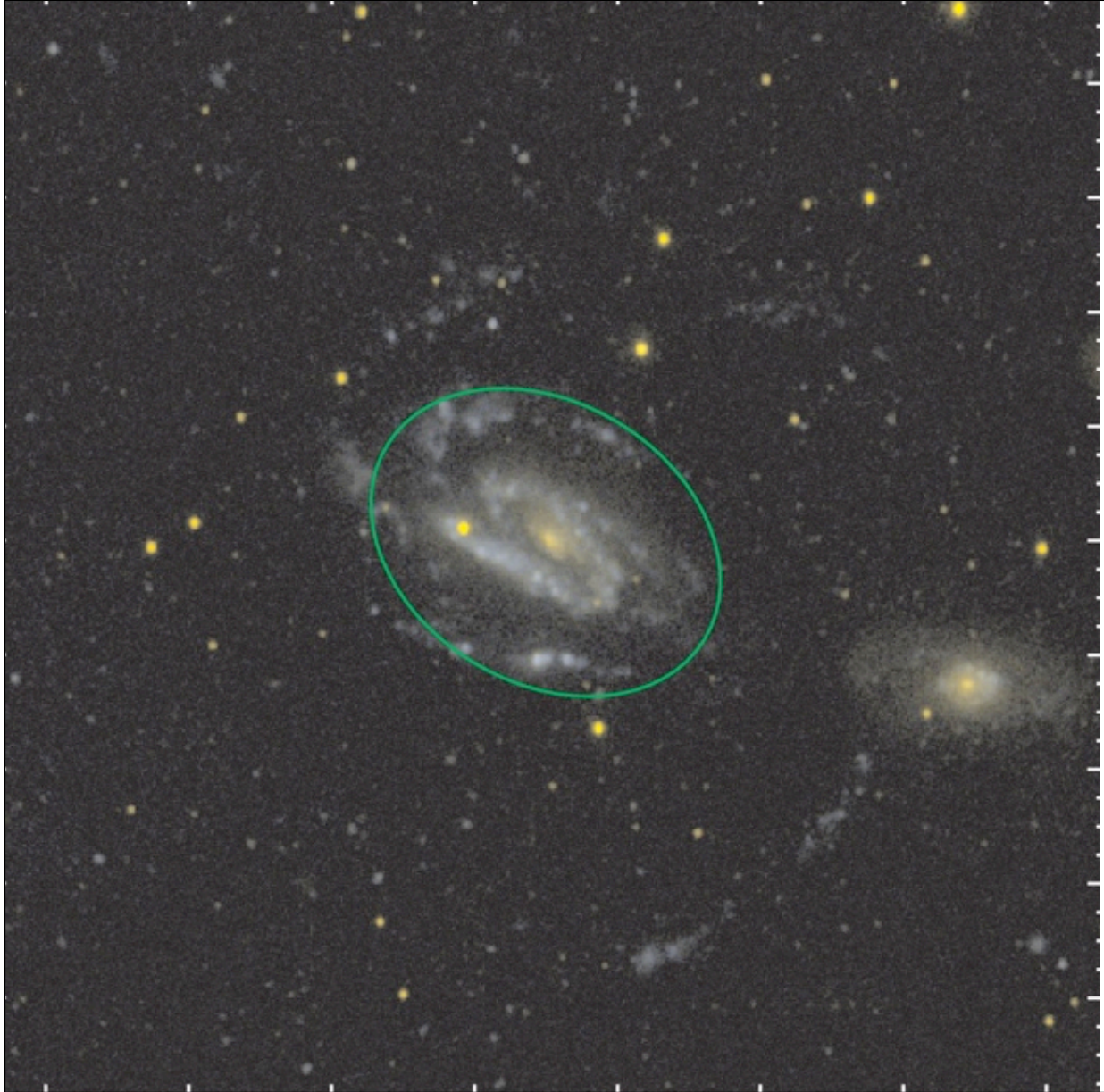




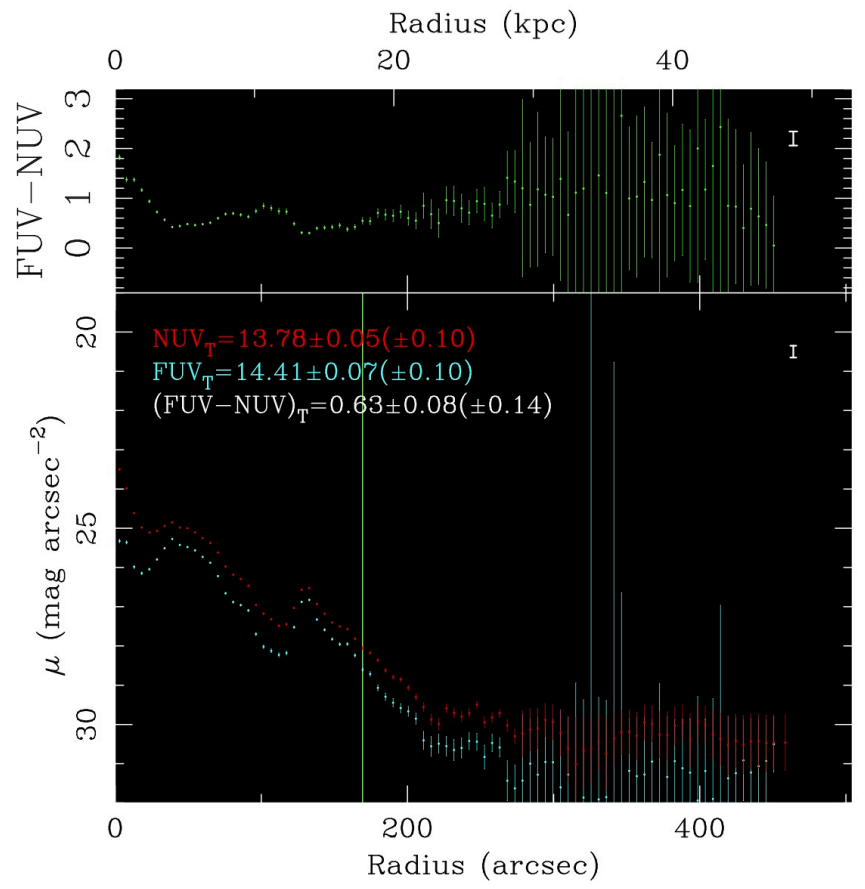
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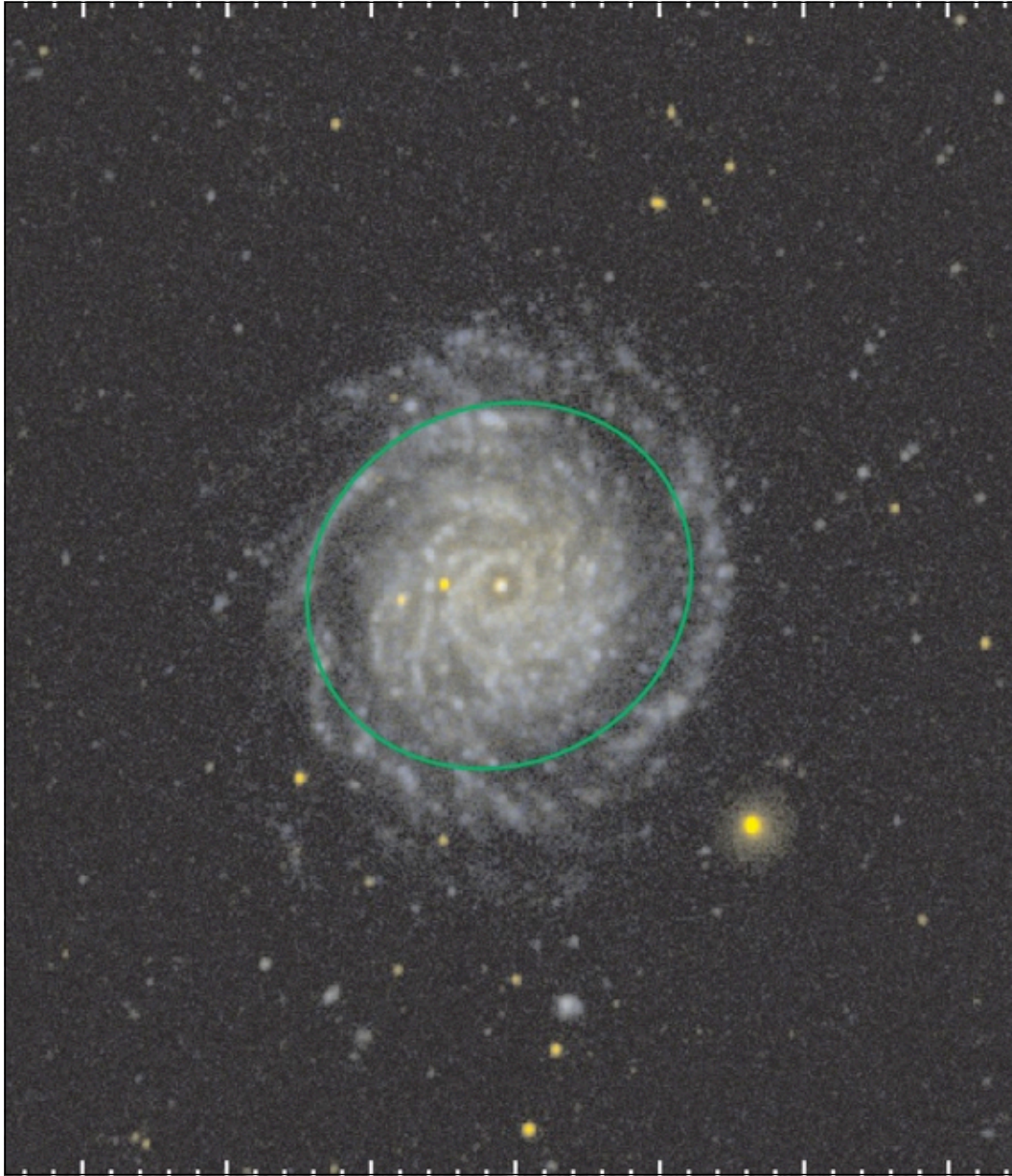


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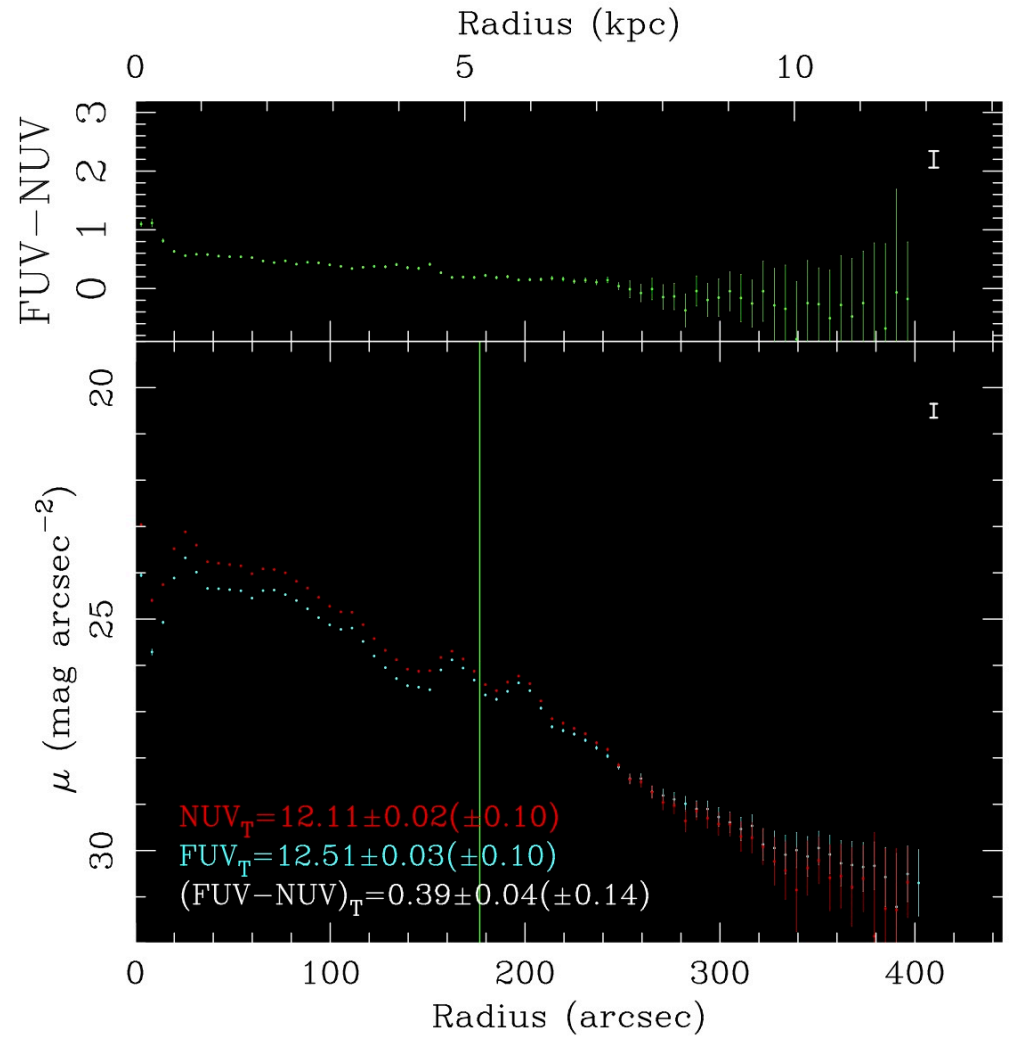


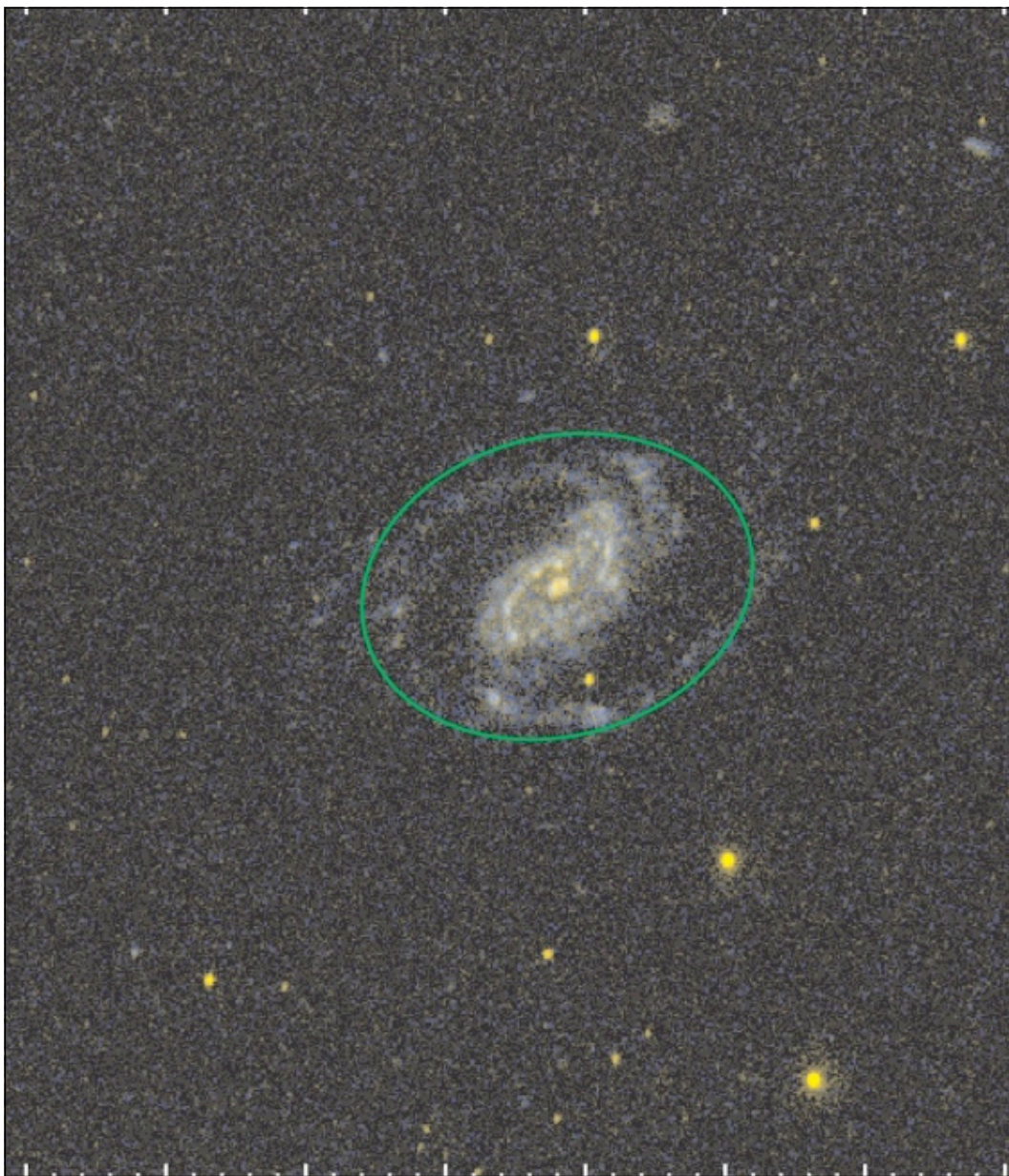
NGC3169



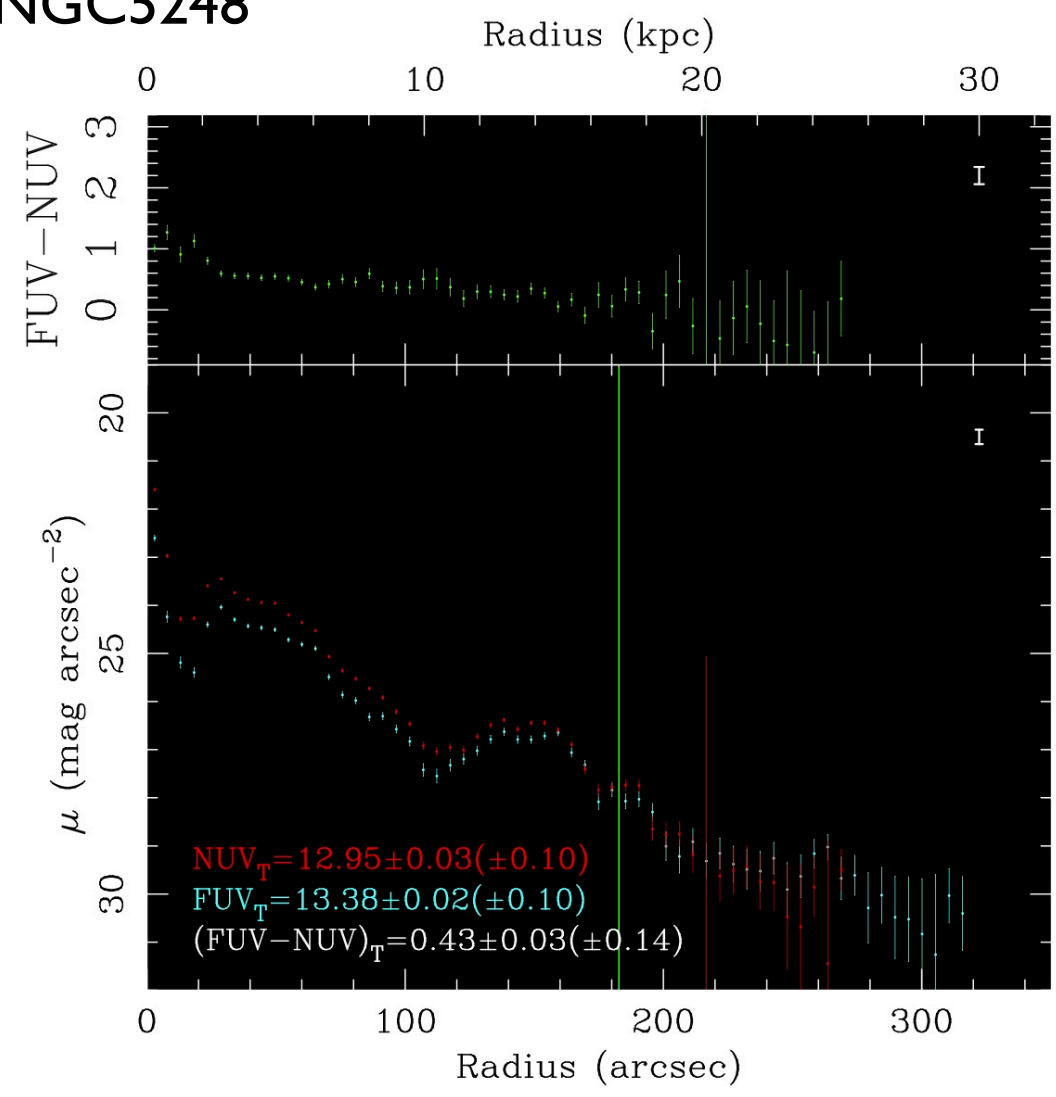


NGC3344



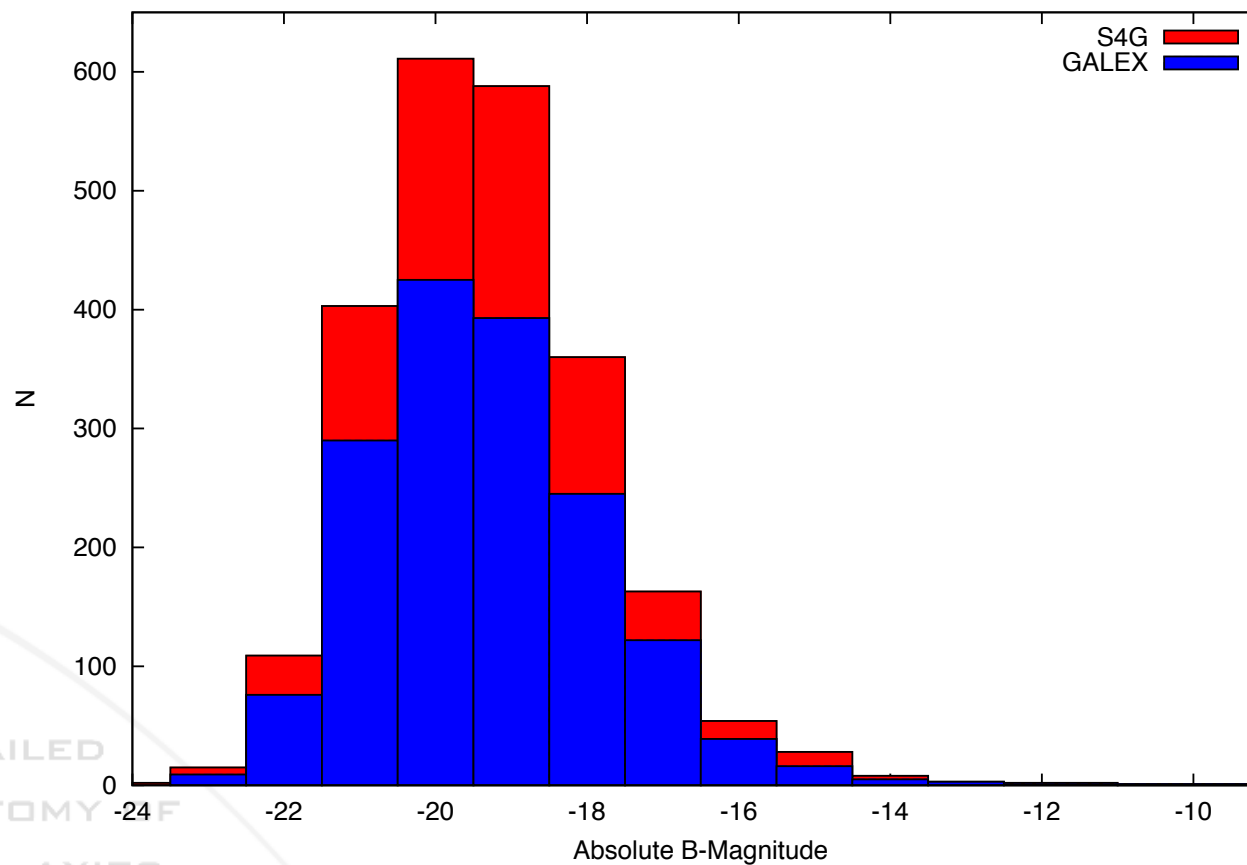


NGC5248



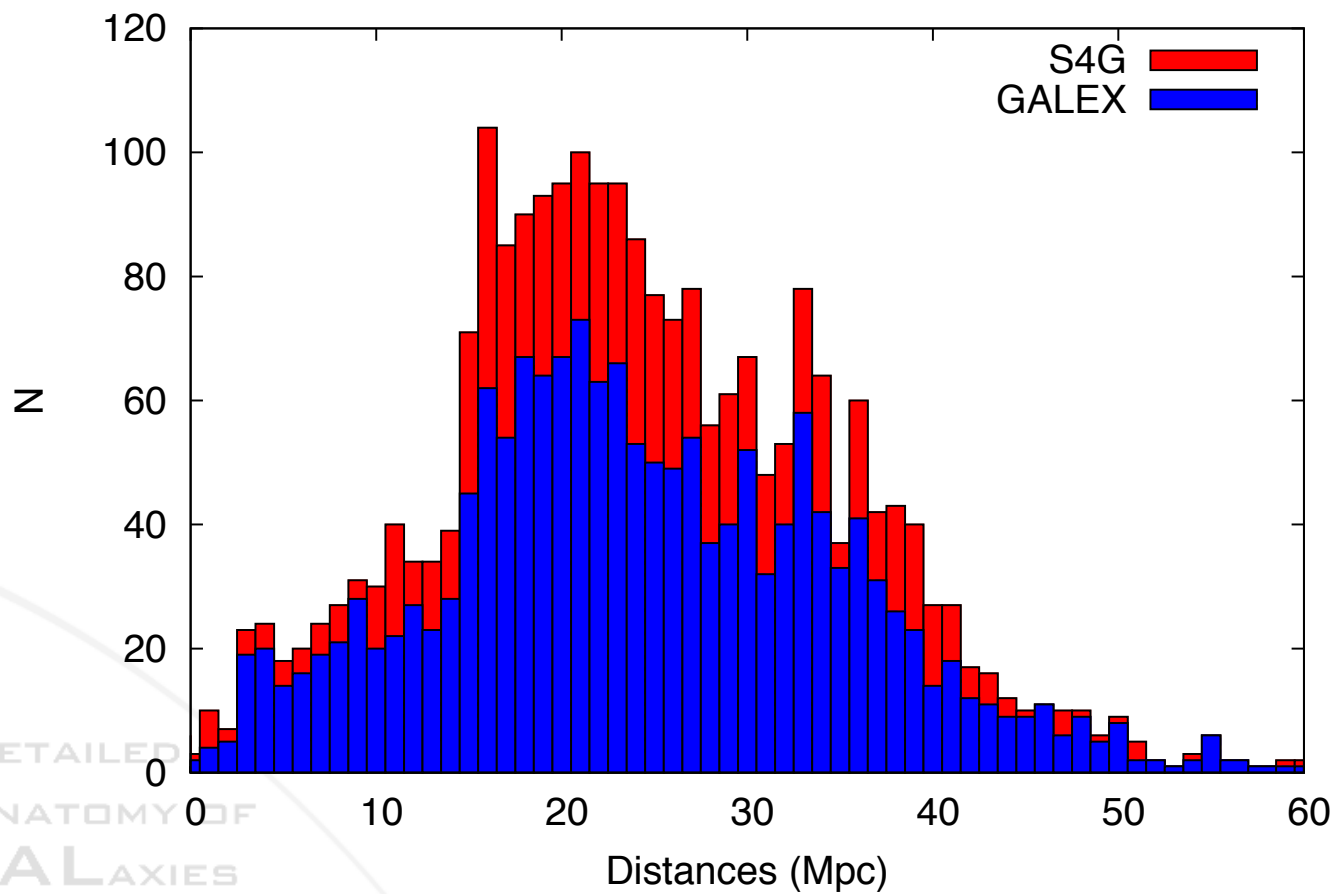
GALEX coverage of S4G

GALEX images coverage of S4G galaxies by Abs. B-Mag



GALEX coverage of S4G

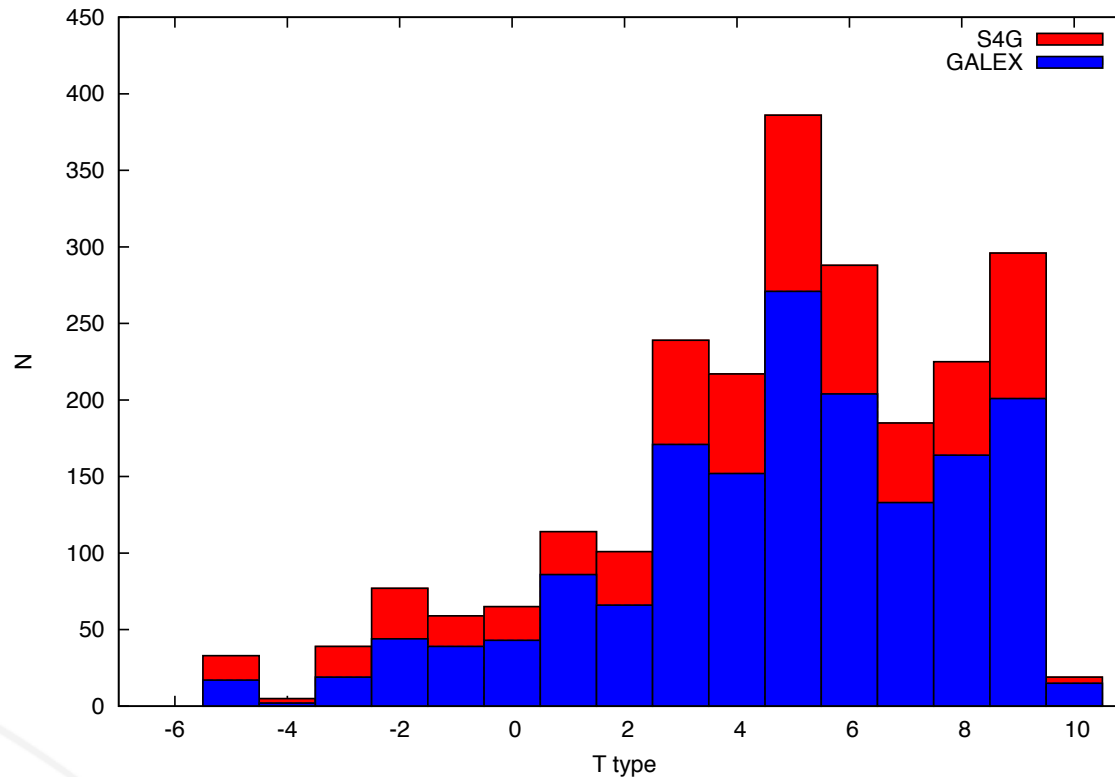
GALEX images coverage of S4G galaxies



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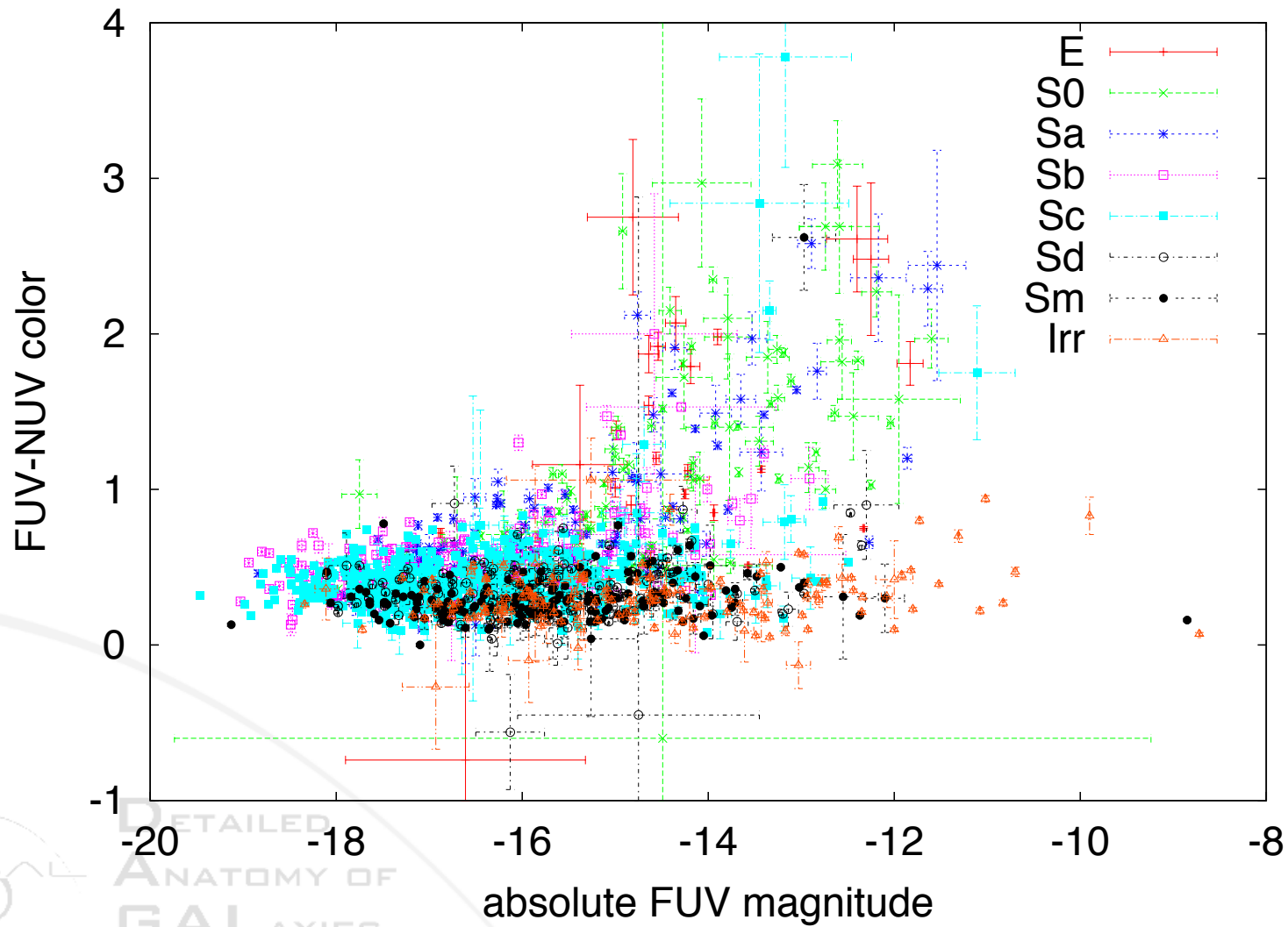
GALEX coverage of S4G

GALEX images coverage of S4G galaxies



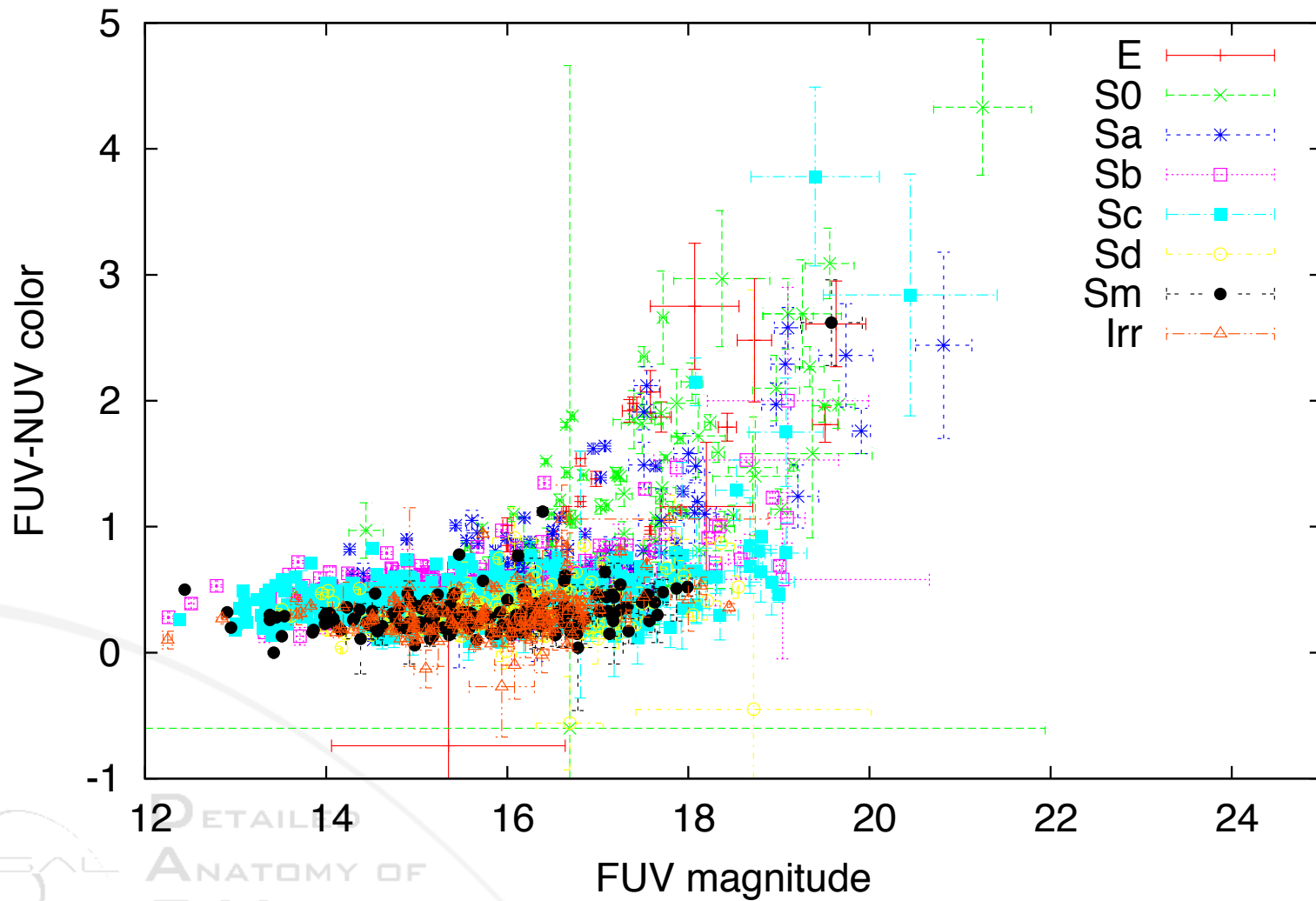
- Thus, we can say that the GALEX sample is representative of the S4G sample and is fairly “complete”.

Color-magnitude diagram of GALEX/S4G galaxies



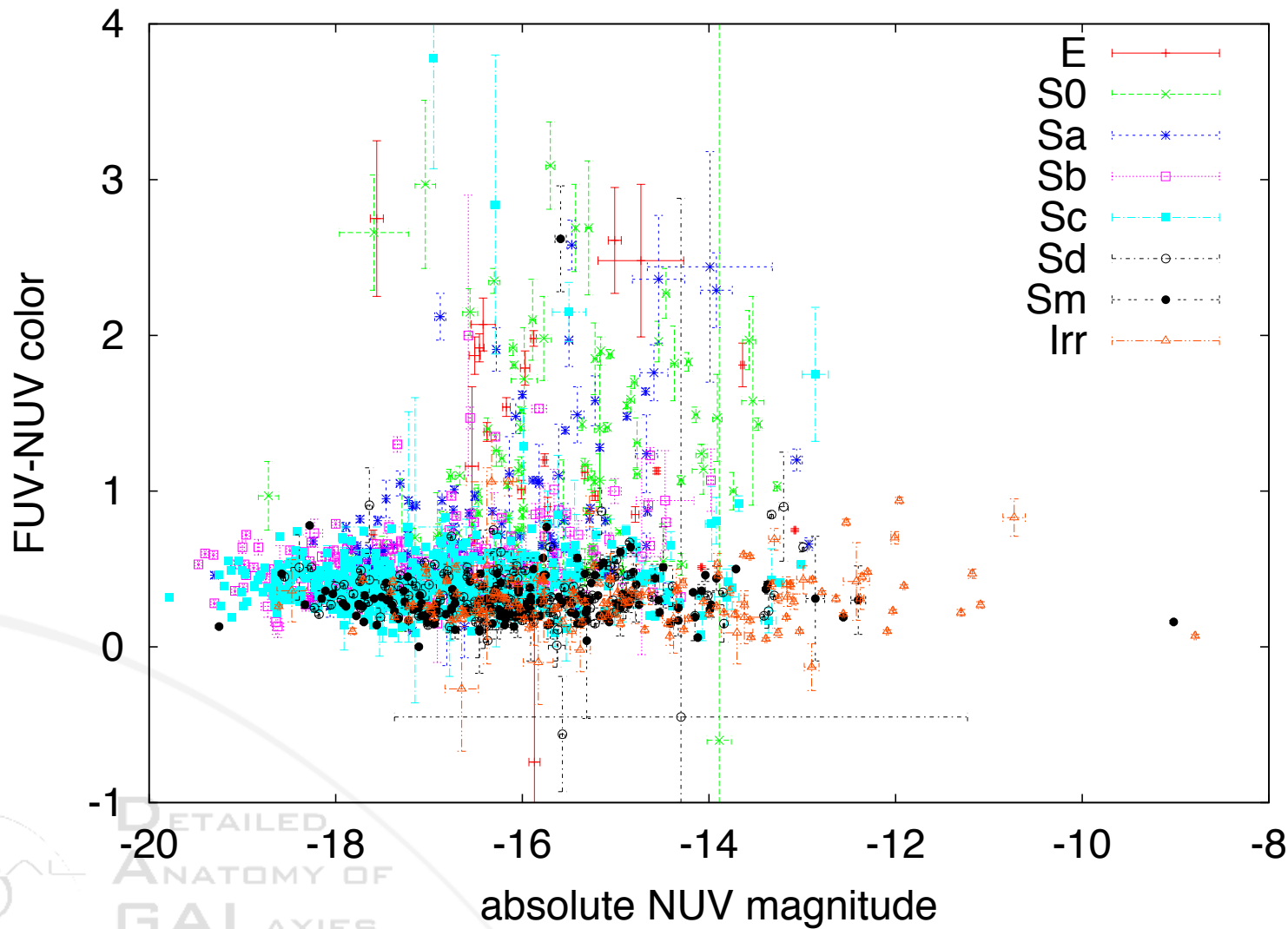
**Color-
abs.magnitude
plot (FUV)**

Color-magnitude diagram of GALEX/S4G galaxies



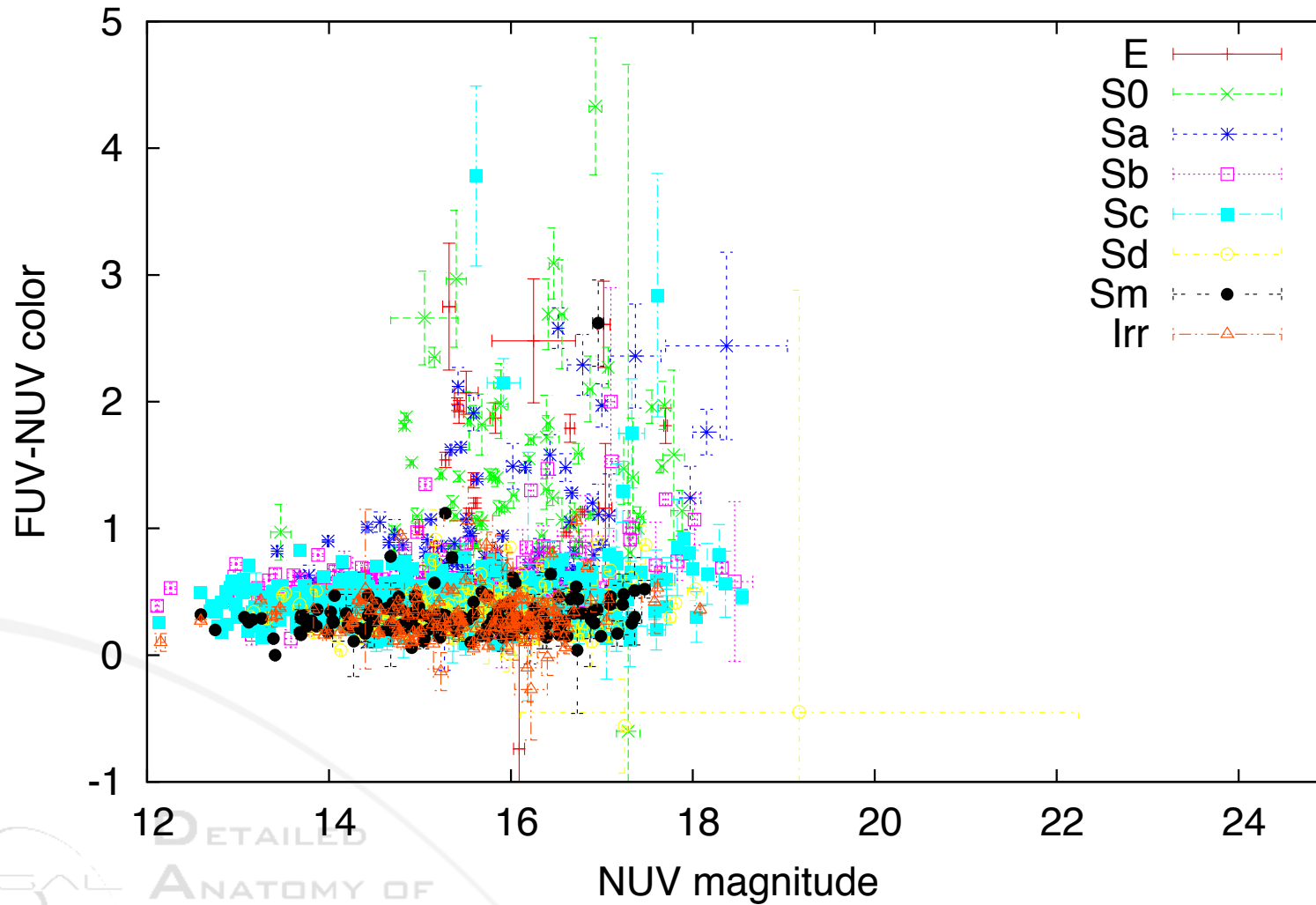
**Color-
magnitude
plot (FUV)**

Color-magnitude diagram of GALEX/S4G galaxies



**Color-
abs.magnitude
plot (NUV)**

Color-magnitude diagram of GALEX/S4G galaxies

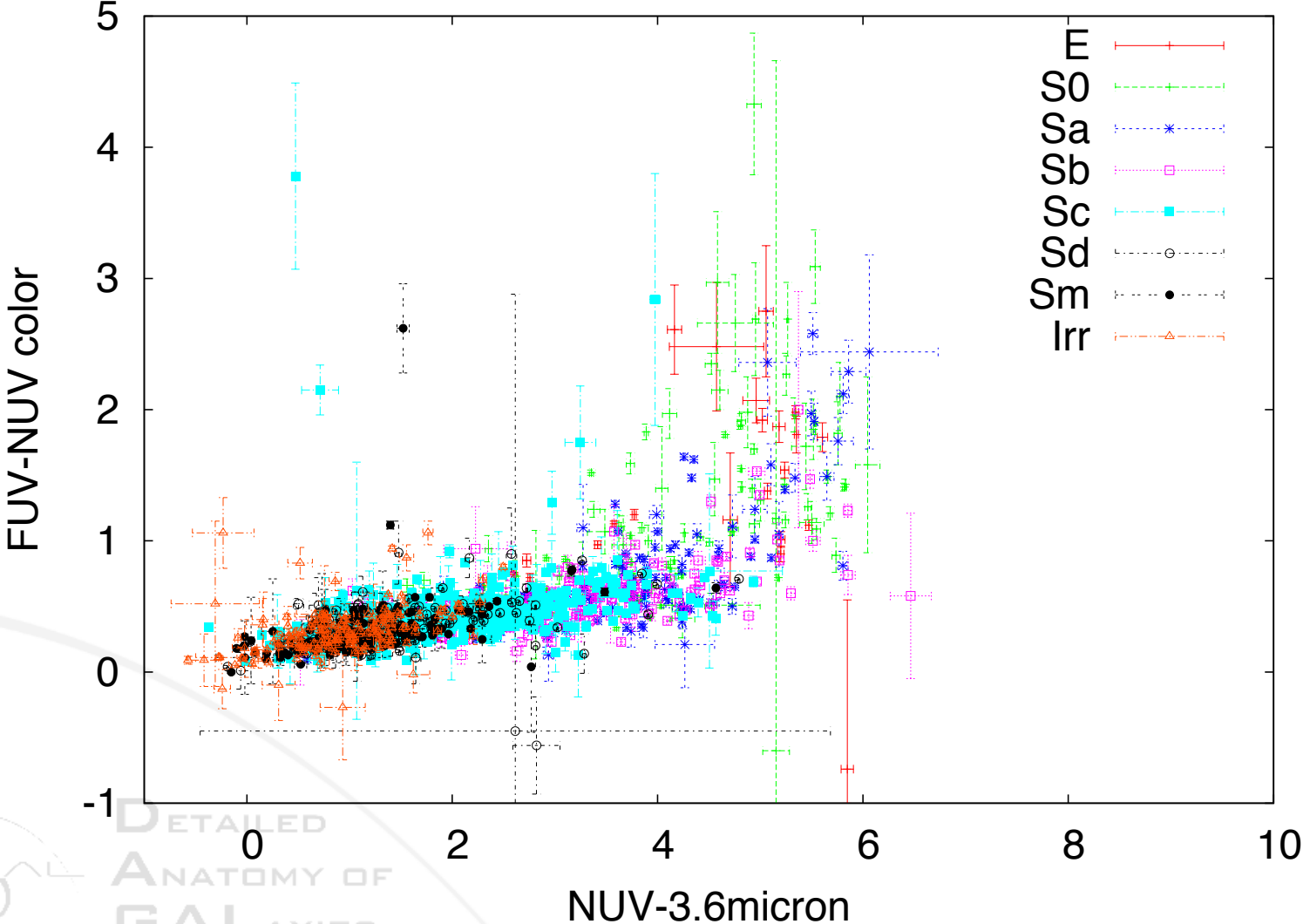


**Color-
magnitude
plot (NUV)**

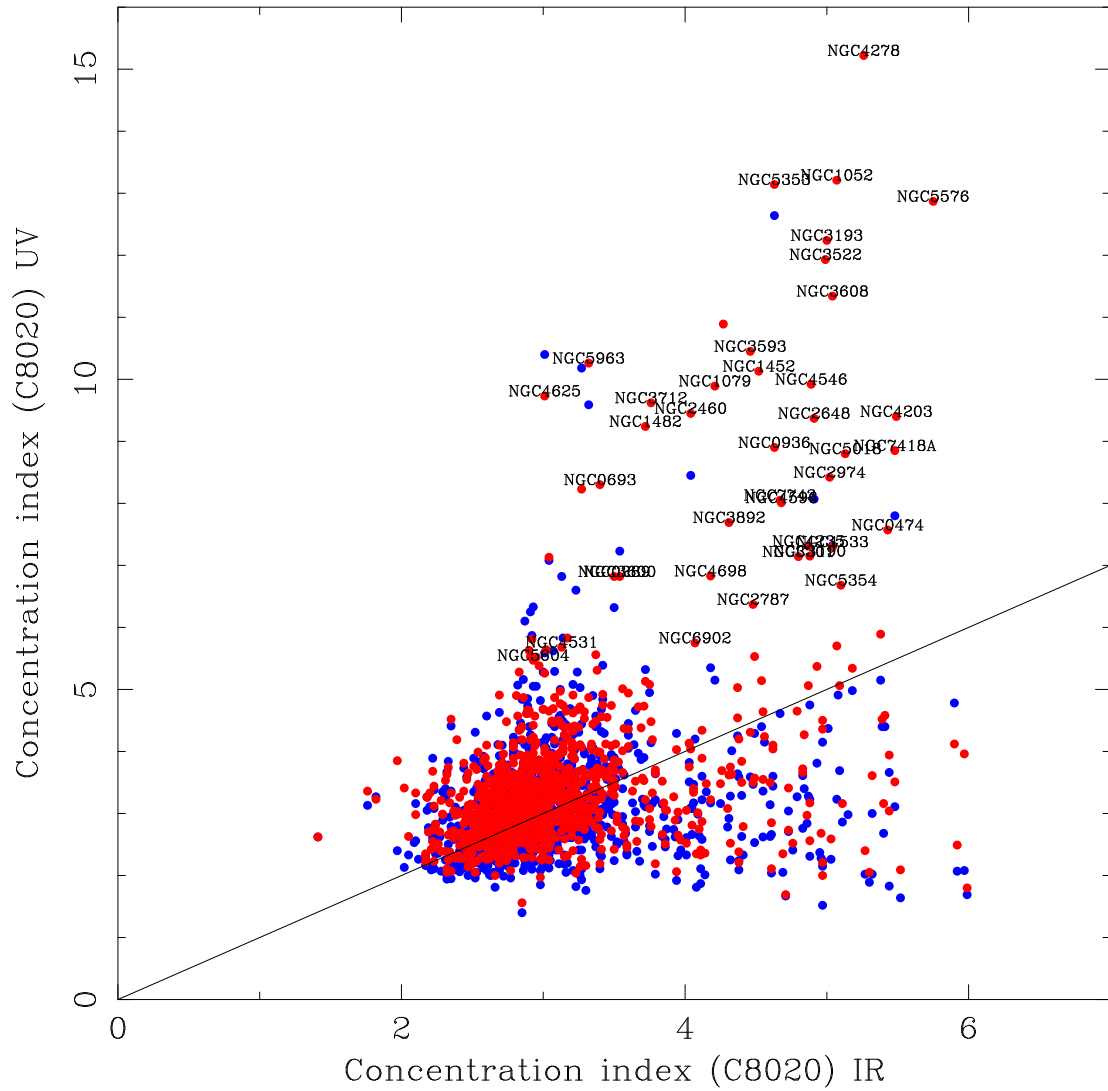


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Color-Color diagram of GALEX/S4G galaxies

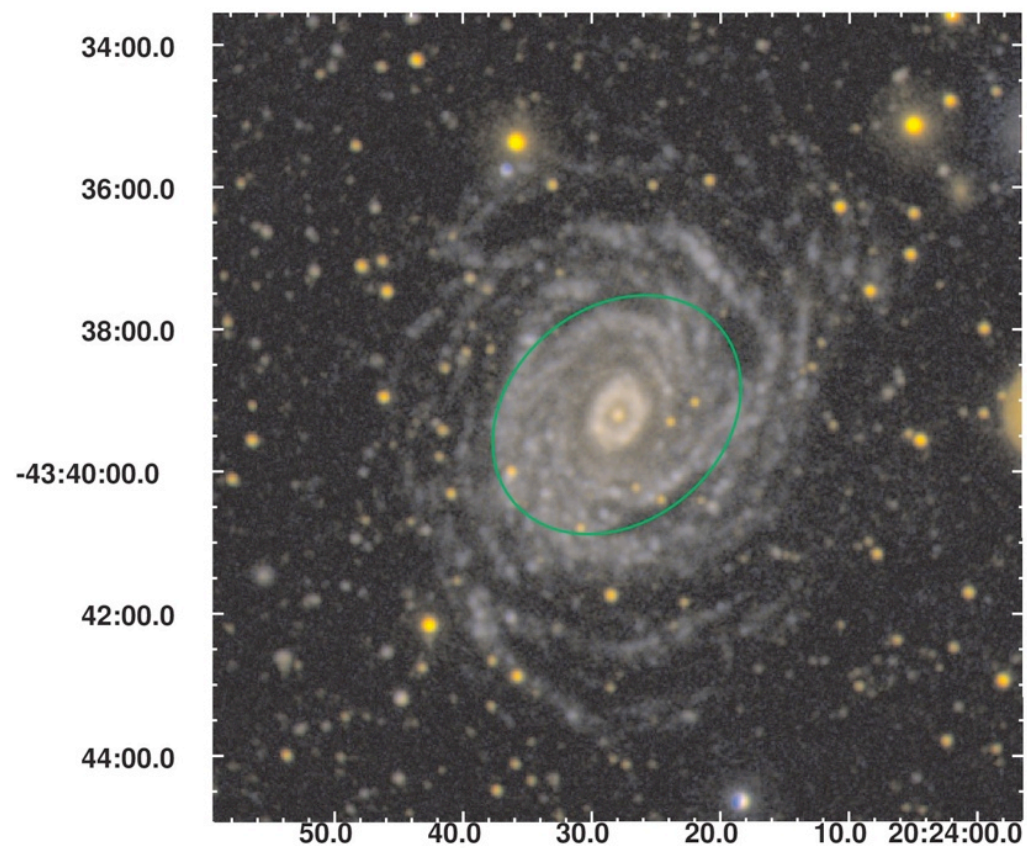
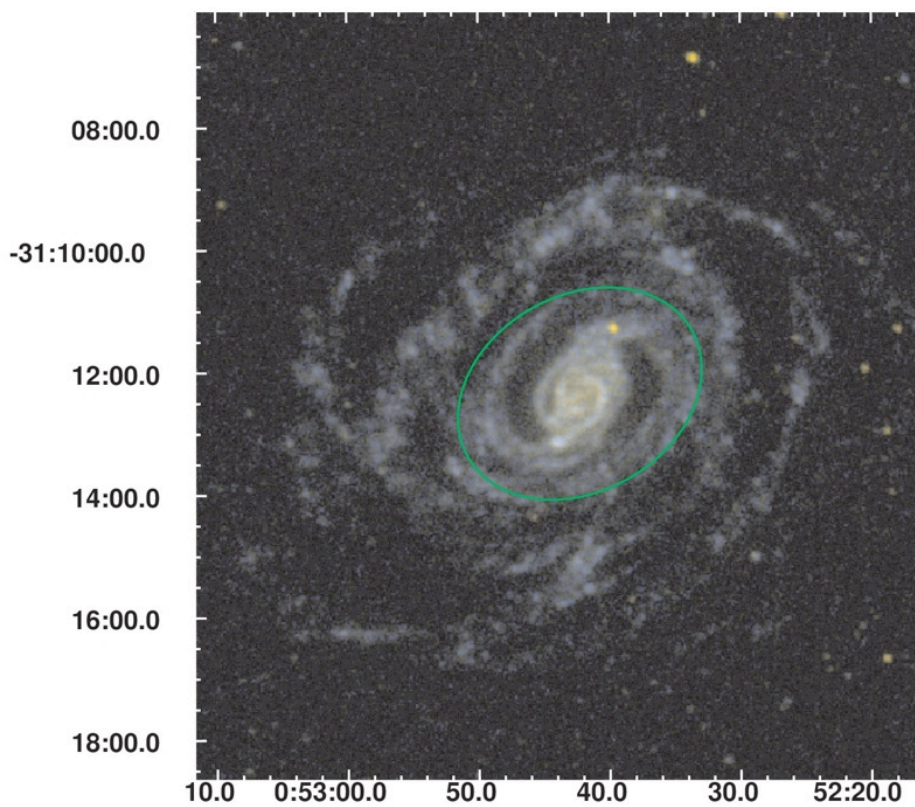


**Color-color
plot**

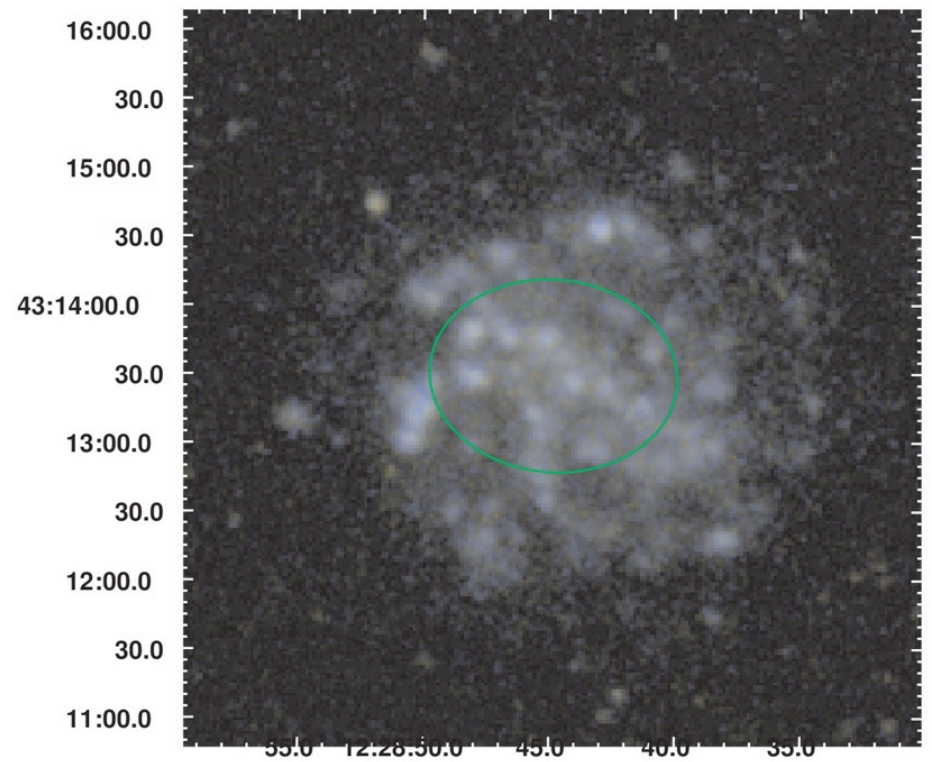
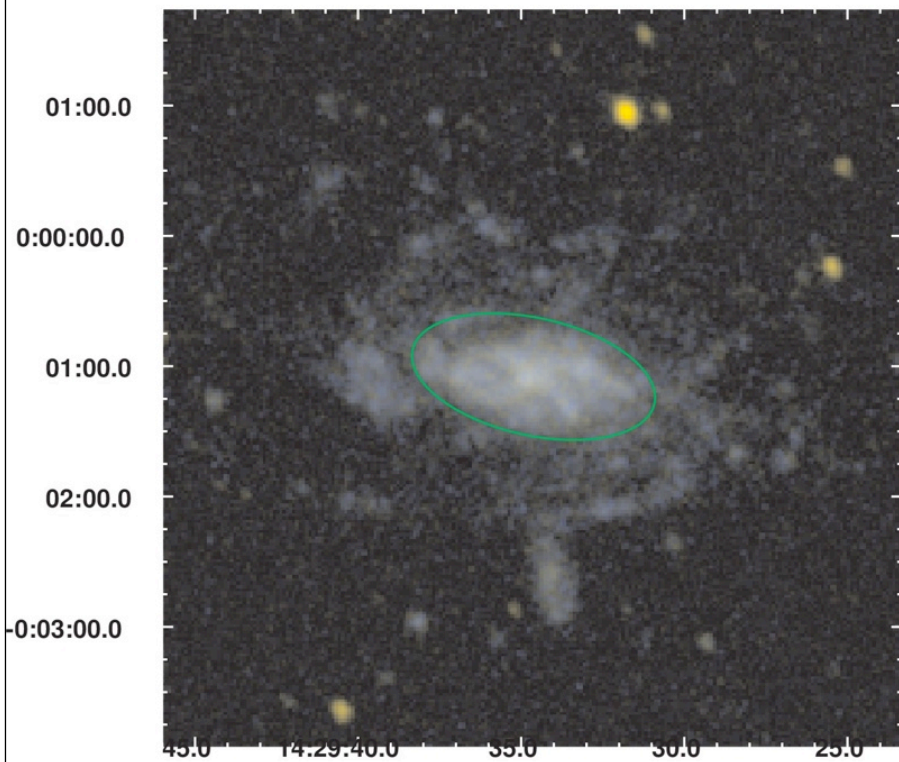


**Concentration Index (C8020) UV
VS
Concentration Index (C8020) IR
(3.6micron)**

Candidate XUV



more candidate XUV



Main Deliverables Schedule

- June 2013: Complete GALEX/S4G galaxies photometry XUV identification and classification and publish.
- September 2013: Produce first catalogue of HII regions of selected XUV disks galaxies.
- December 2014: Produce spectroscopic catalogue of DAGAL XUV disks galaxies.
- 2015: Apply galaxy evolution models to the photometric and chemical properties of the DAGAL XUV disks galaxies.

More to Come

- Participation in the “First Announcement: Structure and Dynamics of Disk Galaxies”, Arkansas, USA, August 2013.
- Participation in the ESO Workshop “Deconstructing Galaxies: Structure and Morphology in the Era of Large Surveys”, Santiago, Chile, November 2013.
- Follow-up spectroscopic observations proposals to GTC and ESO/VLT.

Side-Project

- Ellipticals with strong UV

CONTACT ME!

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