

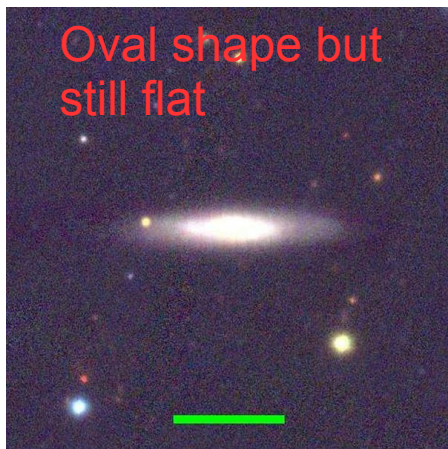
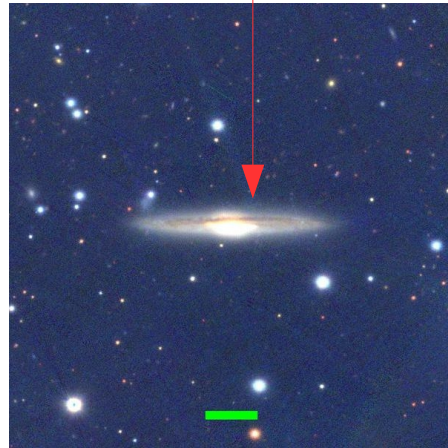
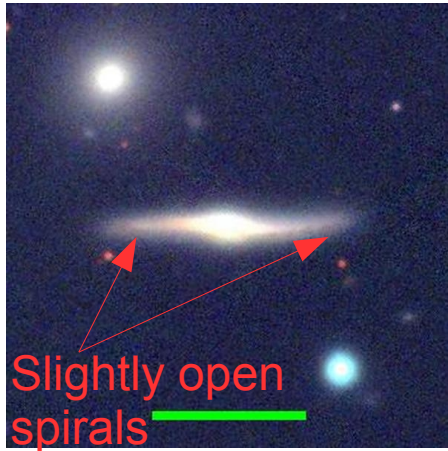
**Classification of edge-on galaxies in
the Pan-STARRS survey:
How to do this right**

Edge-on galaxies

We will select two types of edge-on galaxies:

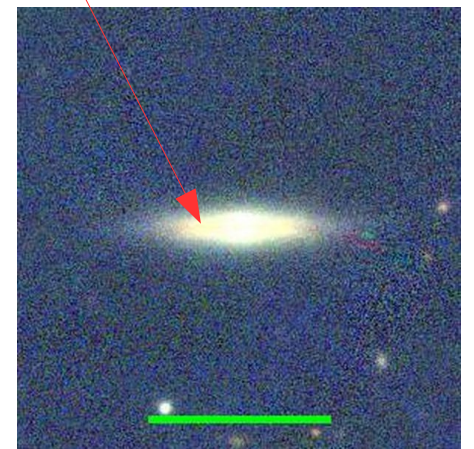
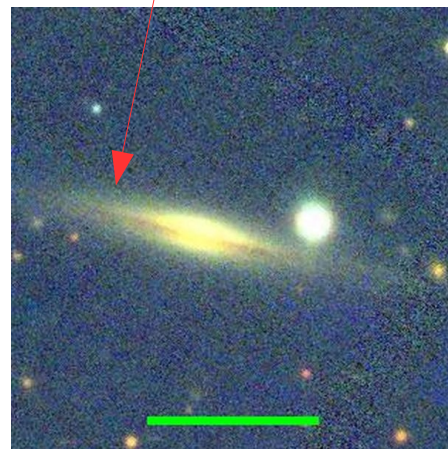
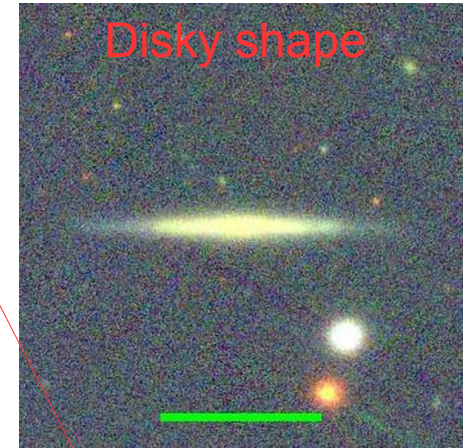
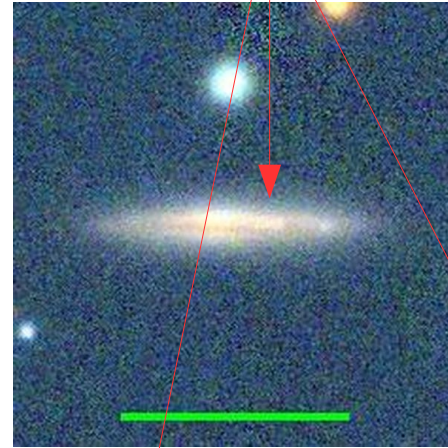
- Slightly not edge-on but still edge-on ($80 \leq i \leq 85$)

Note: The dust lane can be visible and is significantly off the plane



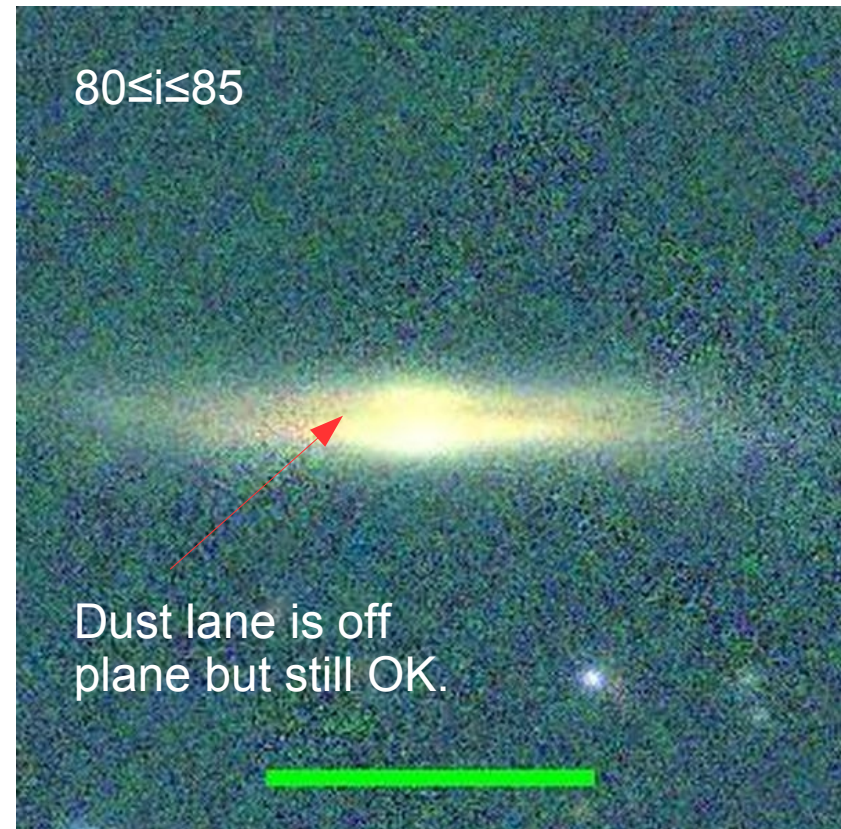
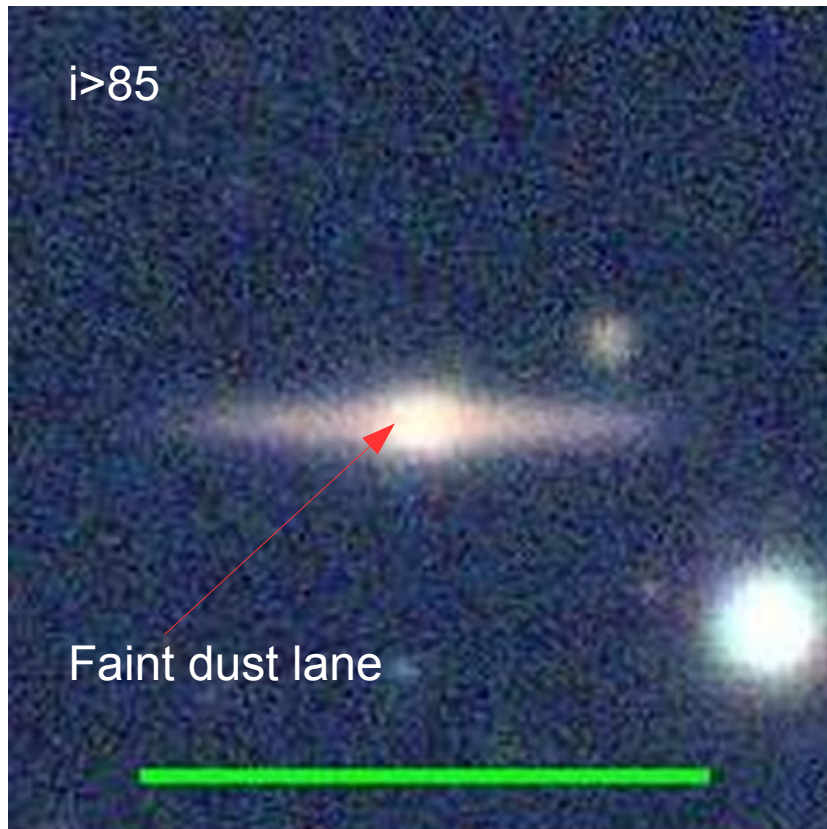
- Pure edge-on or almost edge-on galaxies ($i > 85$)

Note: The dust lane can cross the galaxy or be slightly off the plane



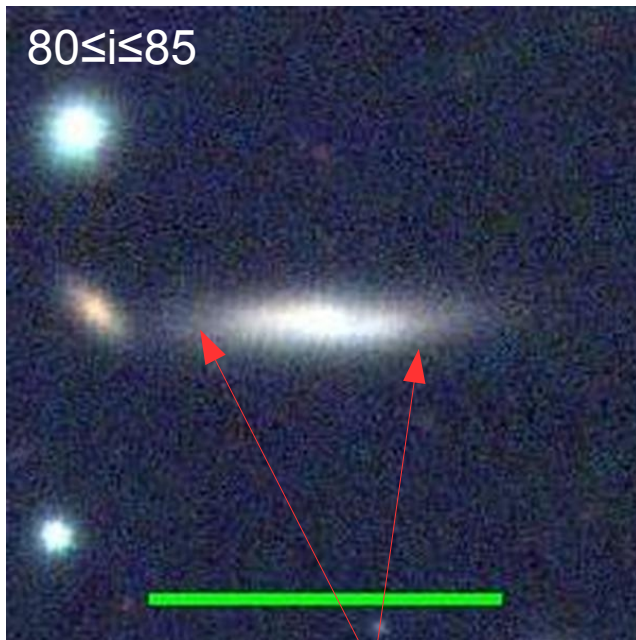
How to select edge-on galaxies

- Very often you can see a dust lane which splits the galaxy in half. In general, if you can see a dust lane over the galaxy body, then you can classify it as (almost) edge-on.

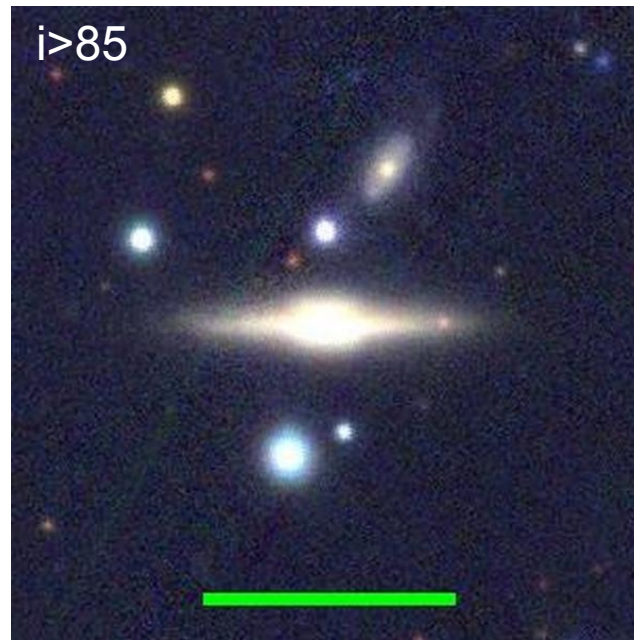


How to select edge-on galaxies

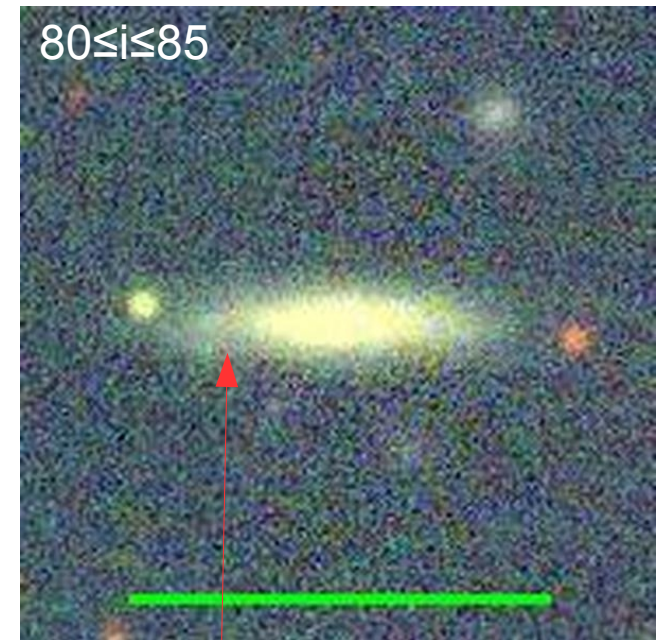
- If the apparent major-to-minor axis ratio is larger than ~ 4 and no (open) spiral arms are seen,
- If the image is very noisy or the size (resolution) of the galaxy is small (poor), the galaxy looks quite flat and no (open) spiral arms are seen,
- However, there are exceptions!



It seems that these are spirals, but still edge-on.



Galaxy with a huge bulge, but the disc looks flat => edge-on

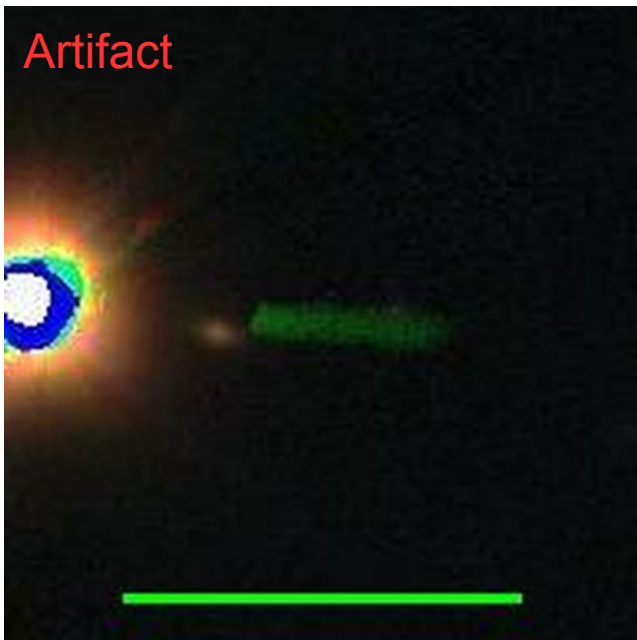
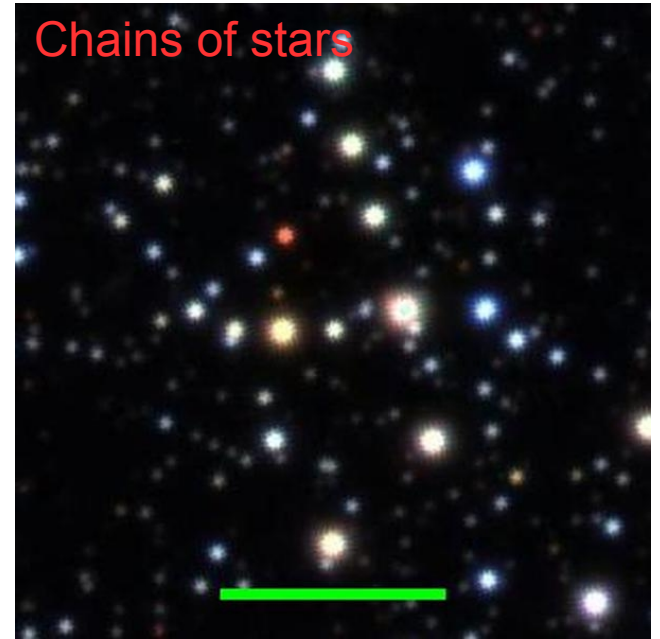
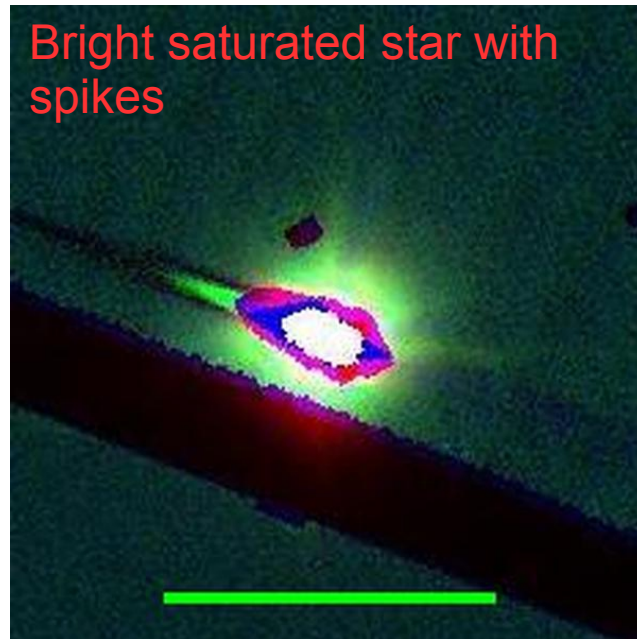
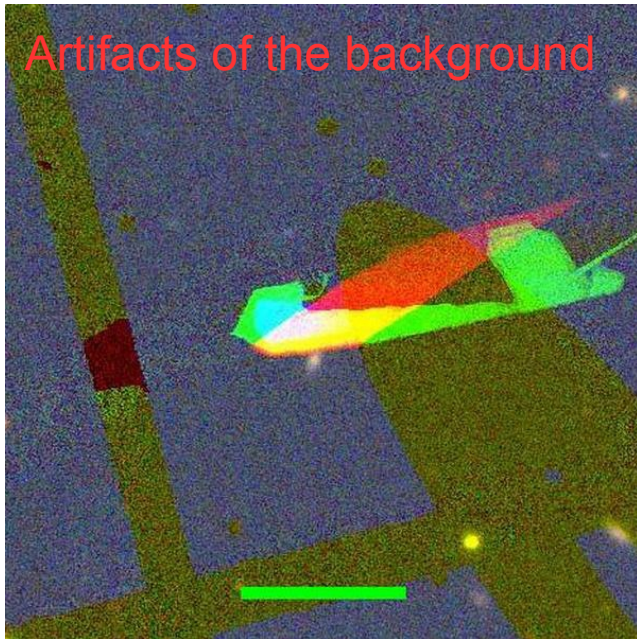


It seems that these are spirals, but not for sure => still edge-on.

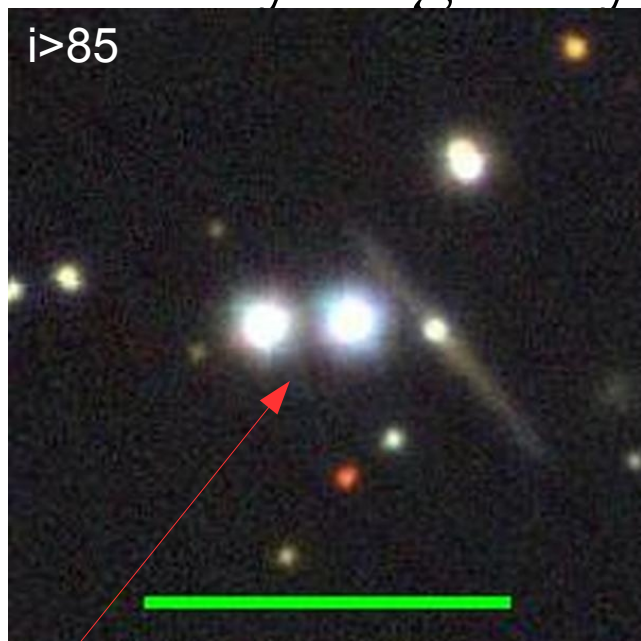
Let's get started

- Register at <https://www.zooniverse.org/>
- **Log in first!**
- Go to
<https://www.zooniverse.org/projects/dmbiz2/pansta>

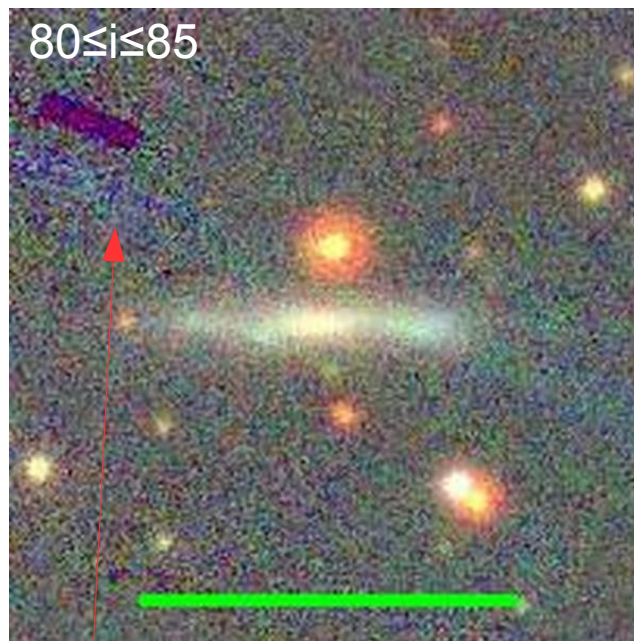
Not a galaxy at all



Bright stars or defects significantly overlap with the body of galaxy



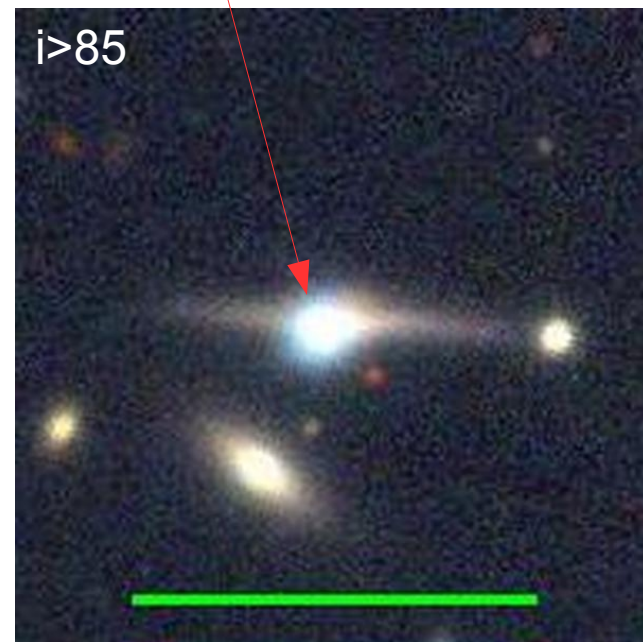
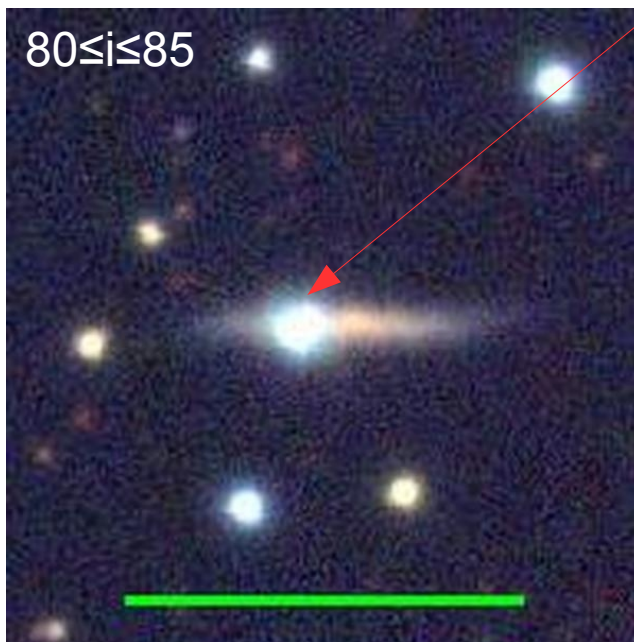
Two bright stars significantly contaminate the galaxy light



Complex non-flat background

NOTE: Choose this answer **only** if you see an edge-on galaxy

! Don't forget to mark what type of edge-on galaxy it is: $80 \leq i \leq 85$ or $i > 85$!

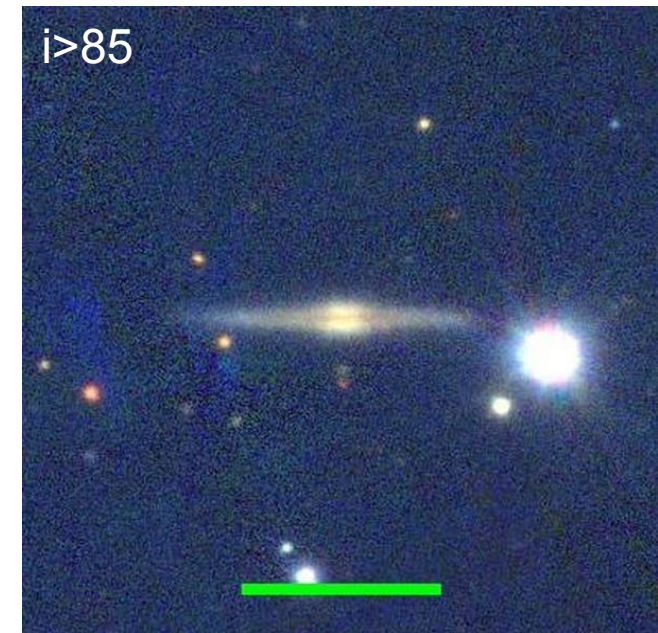
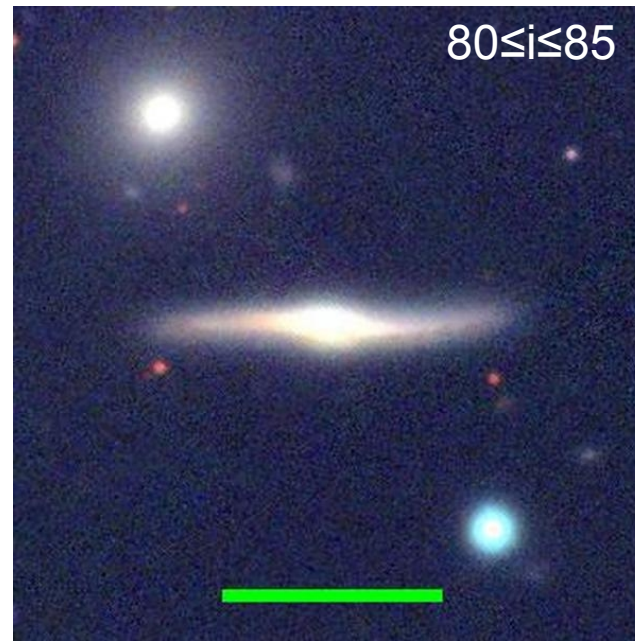
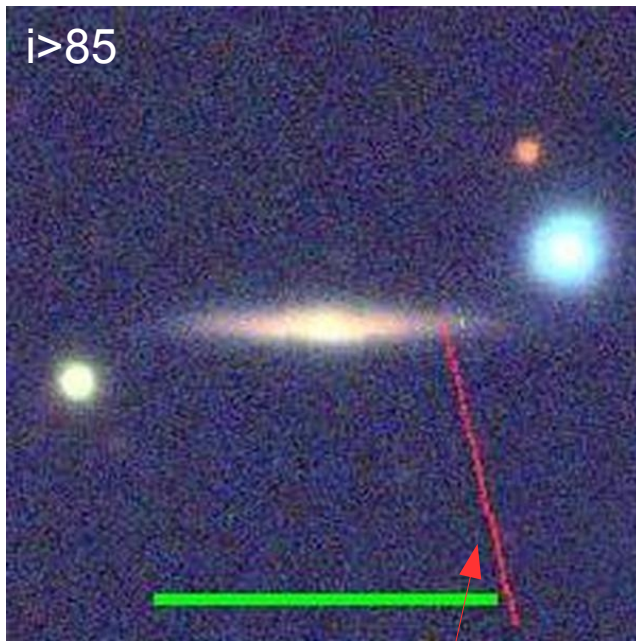


Bright star significantly overlap with the galaxy

BUT

These are good edge-on galaxies

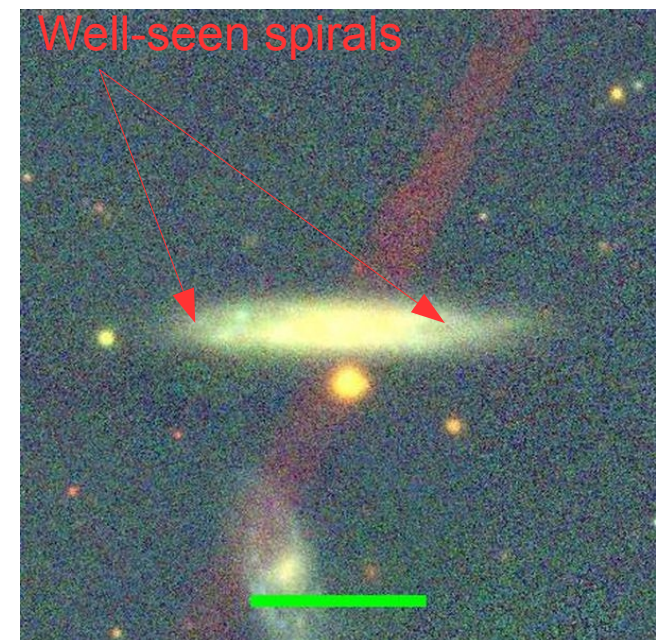
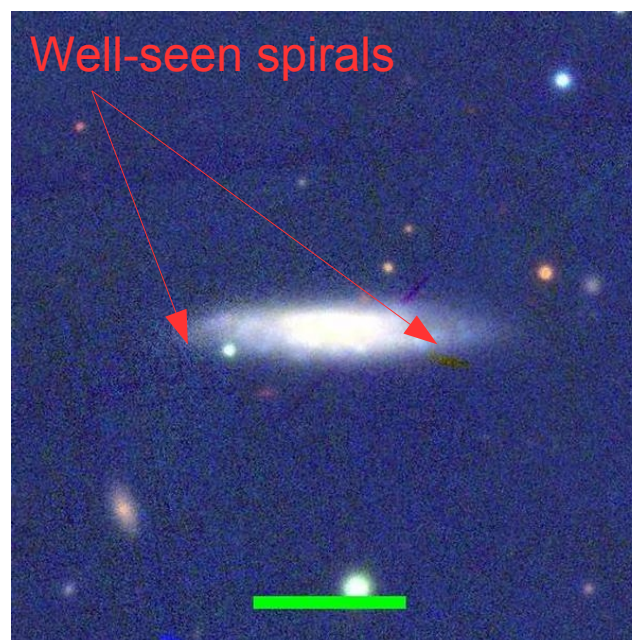
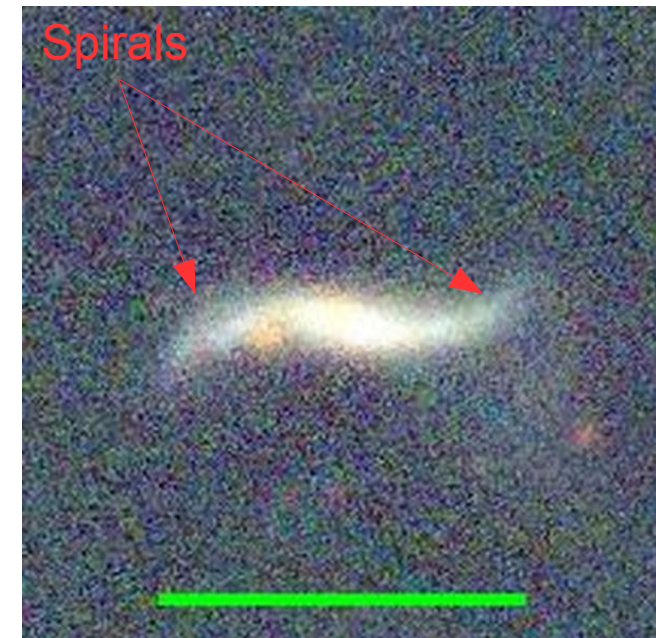
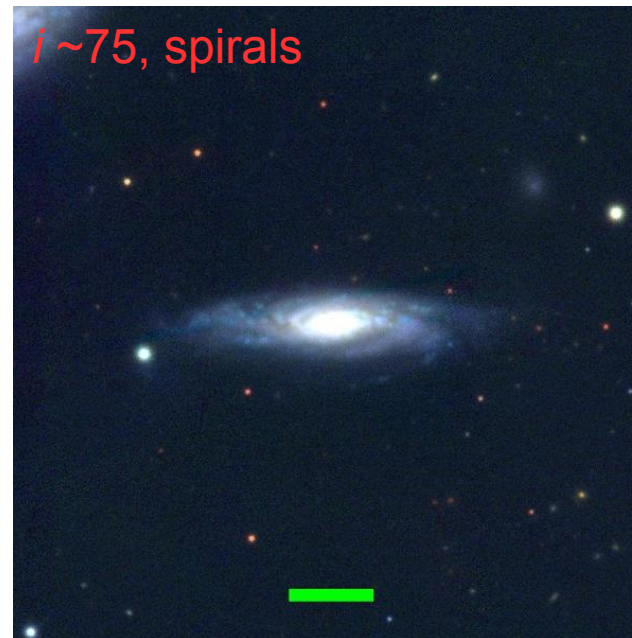
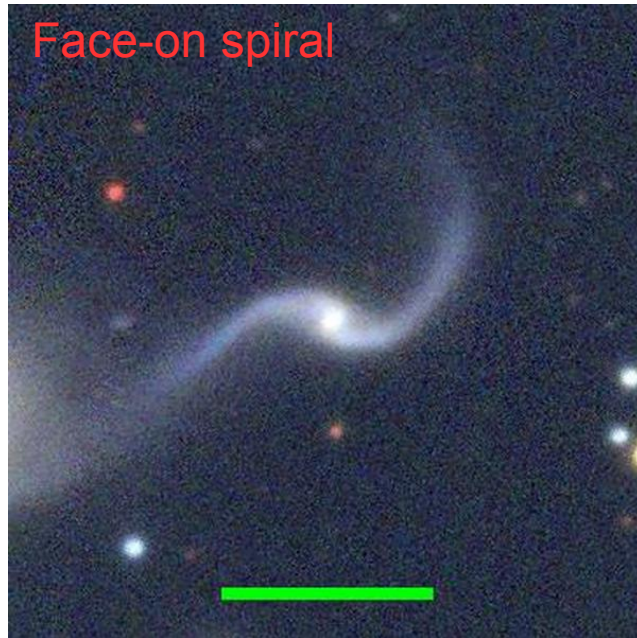
The stars in these images are not so bright or do not overlap with the edge-on galaxy=> OK



This is not a problem for our analysis

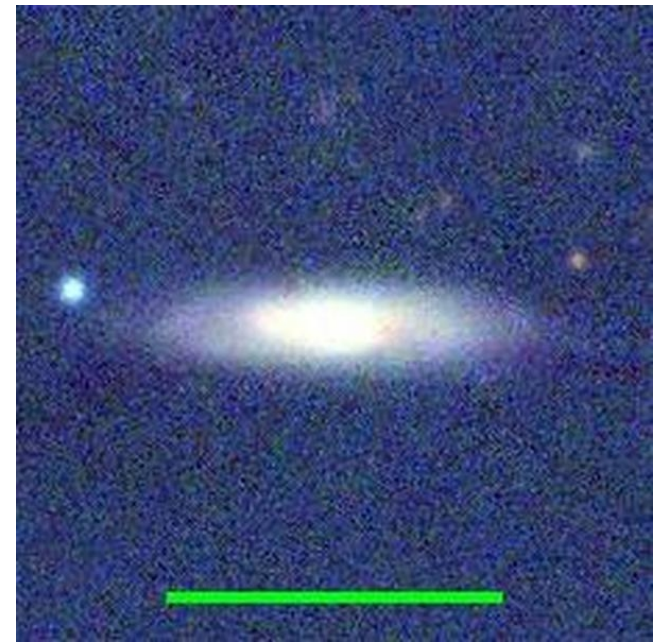
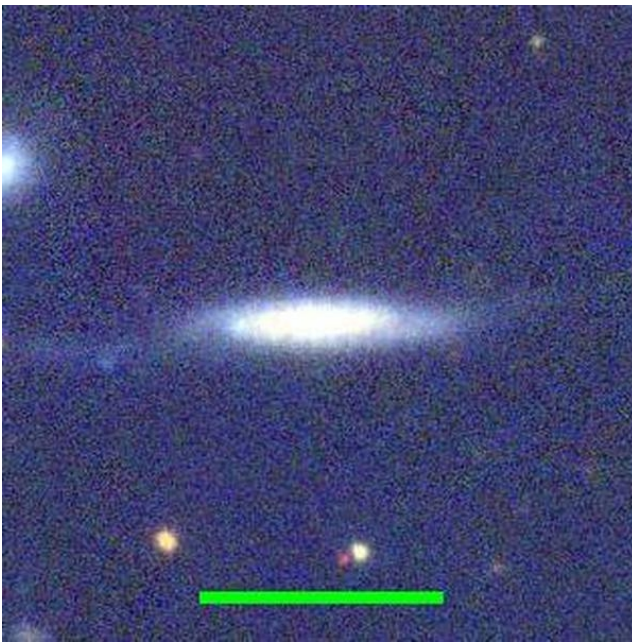
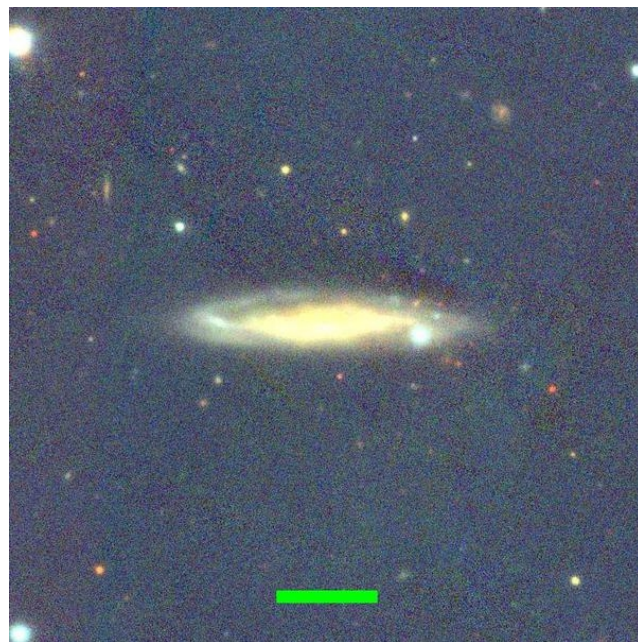
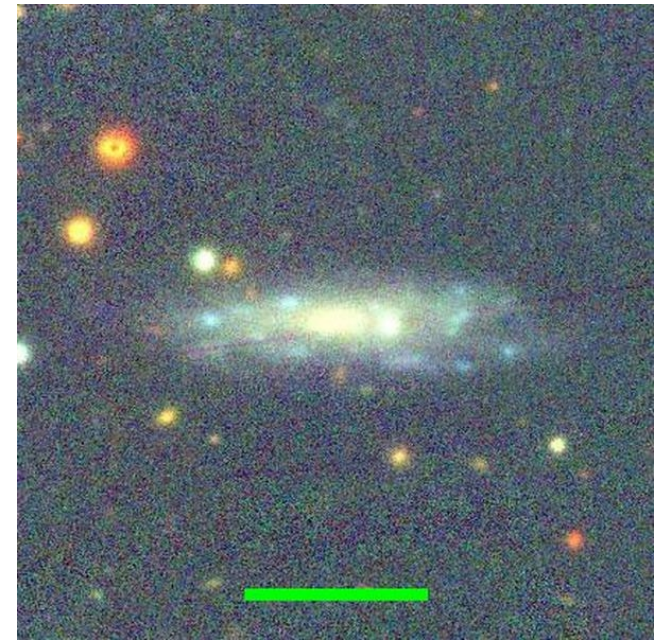
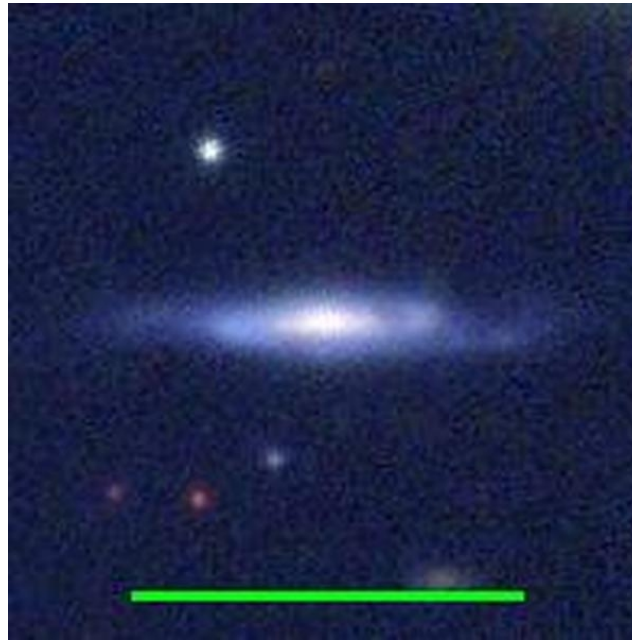
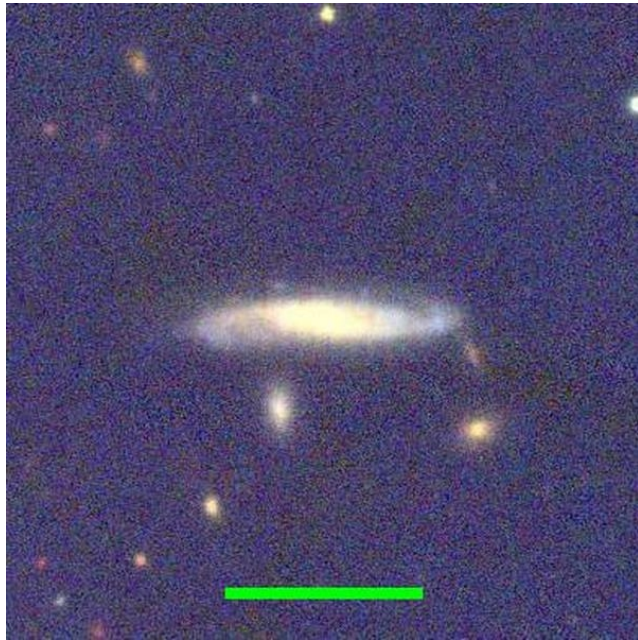
Galaxy, but not edge-on.

All galaxies here demonstrate a quite open spiral structure



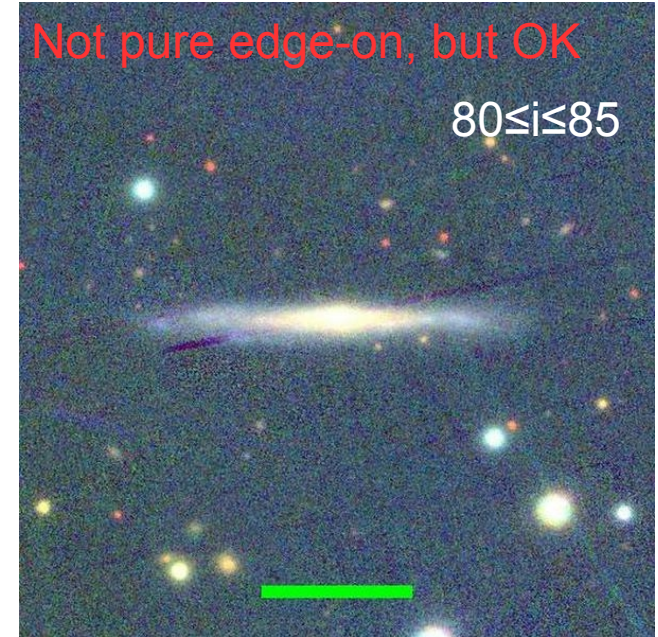
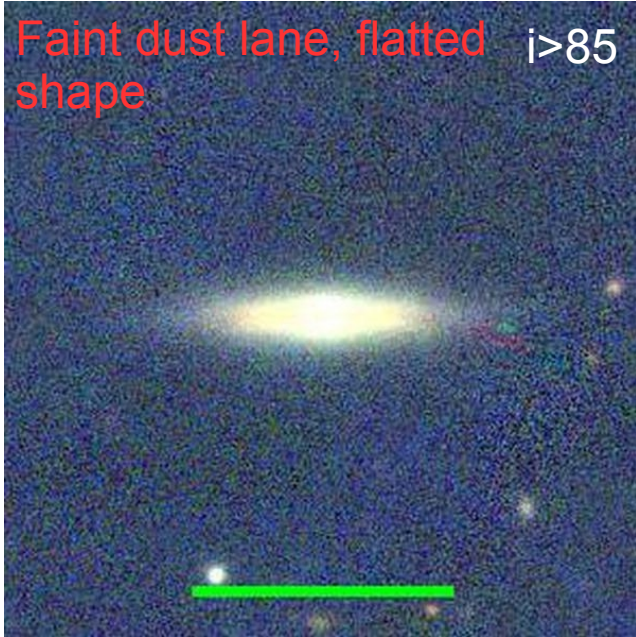
Galaxy, but not edge-on.

All galaxies here demonstrate a quite open spiral structure



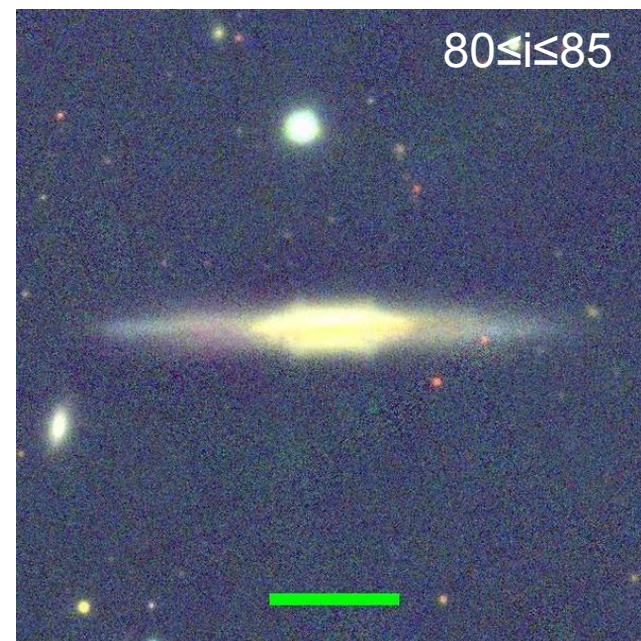
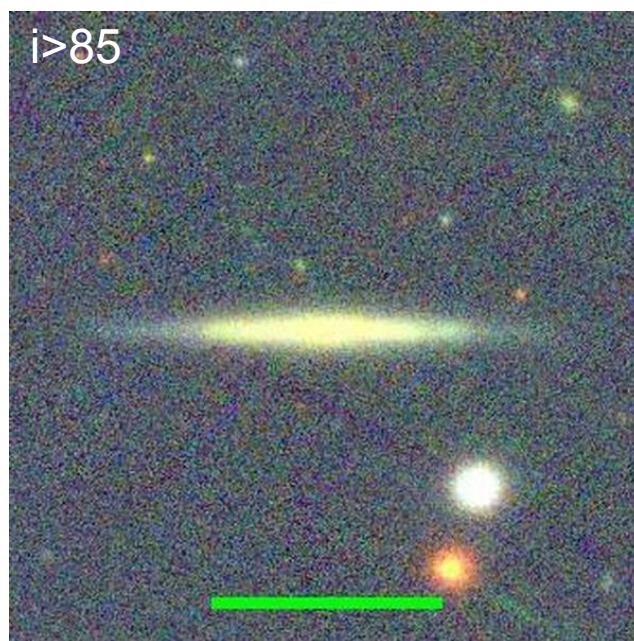
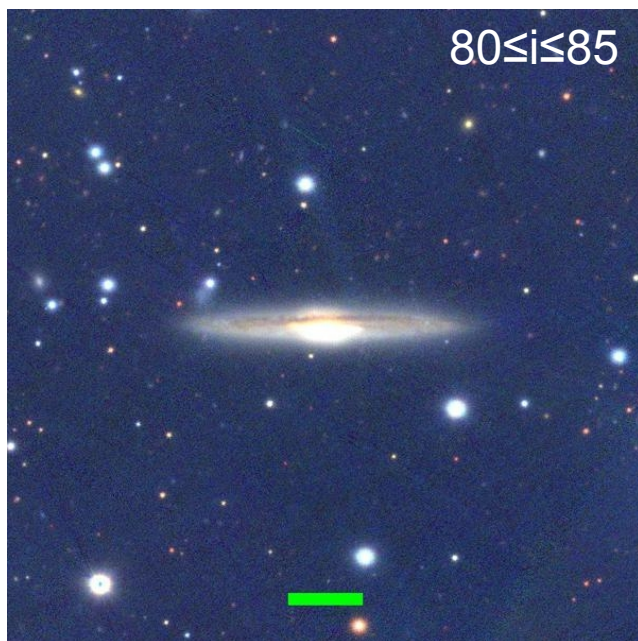
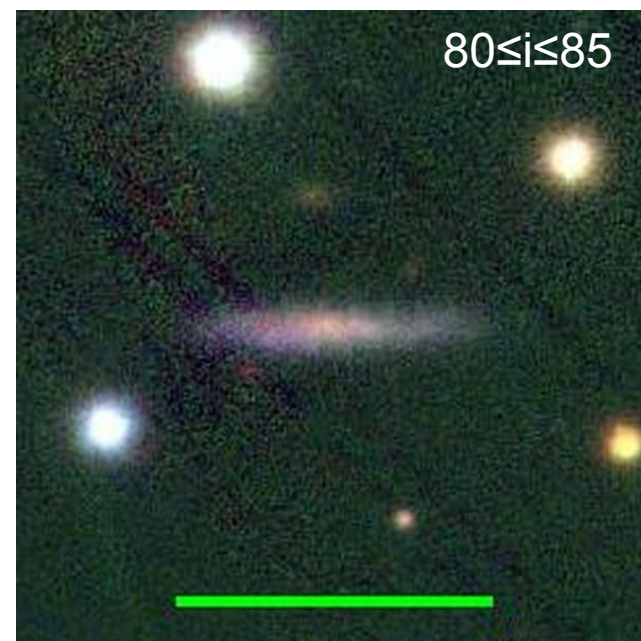
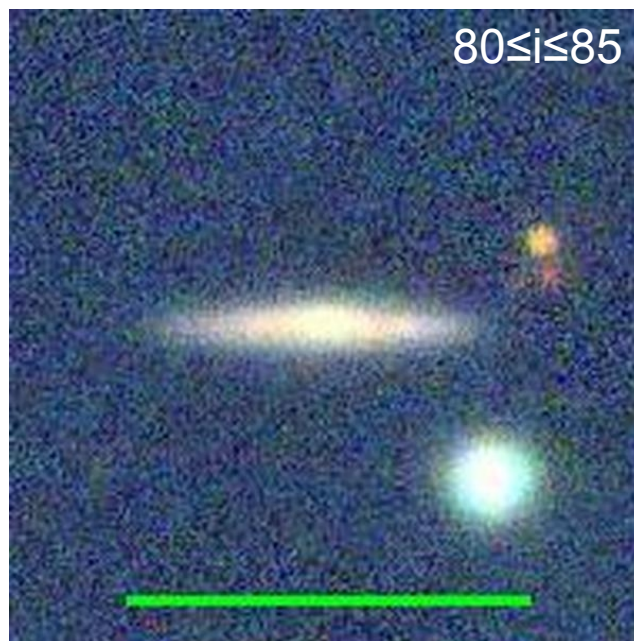
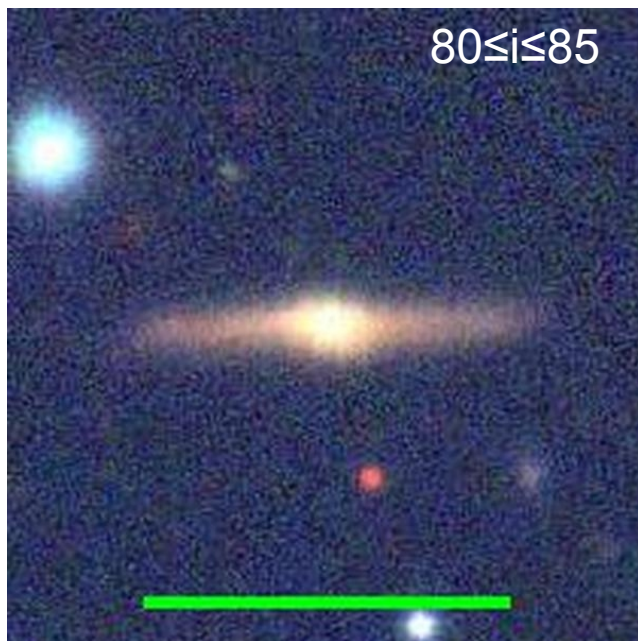
Yes, this is an edge-on galaxy good for analysis.

NOTE THAT WE SELECT GALAXIES WITH $i \geq 80^\circ$, I.E. THEY CAN BE NOT PURE EDGE-ON.



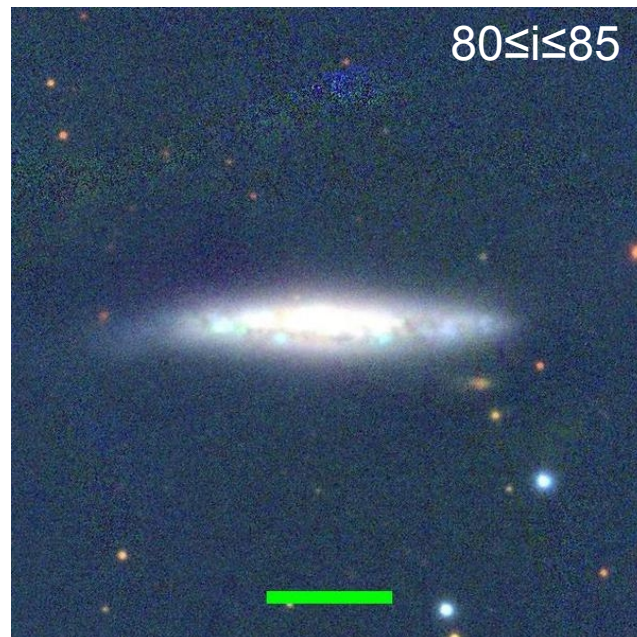
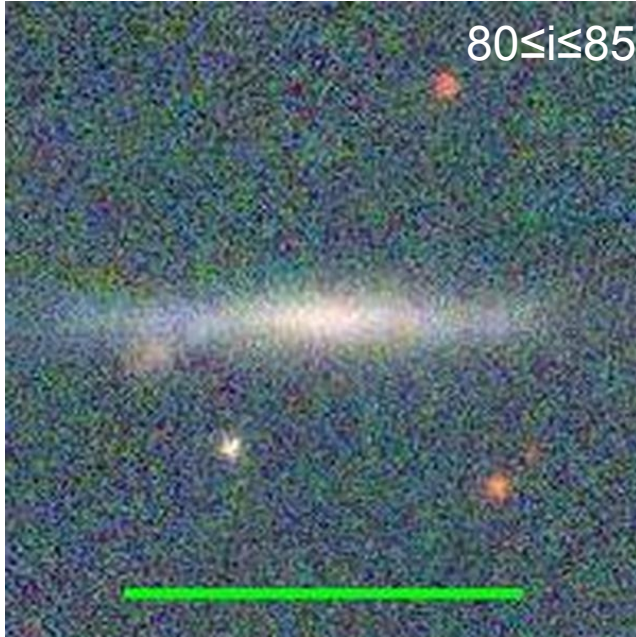
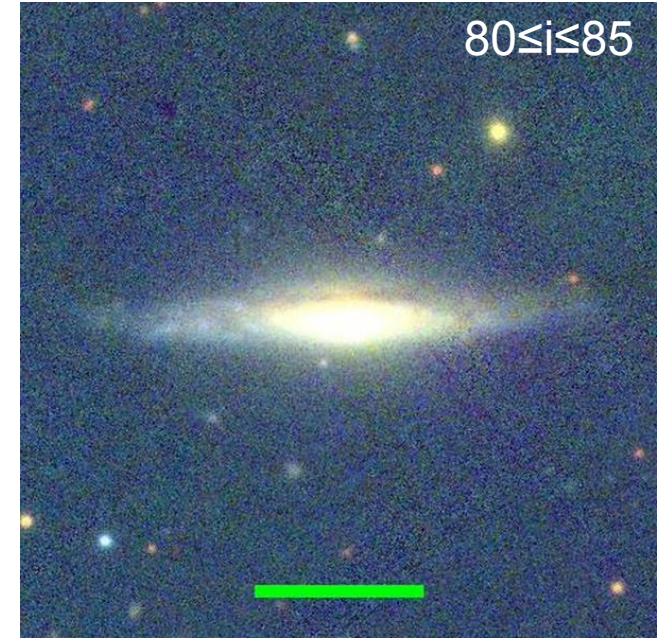
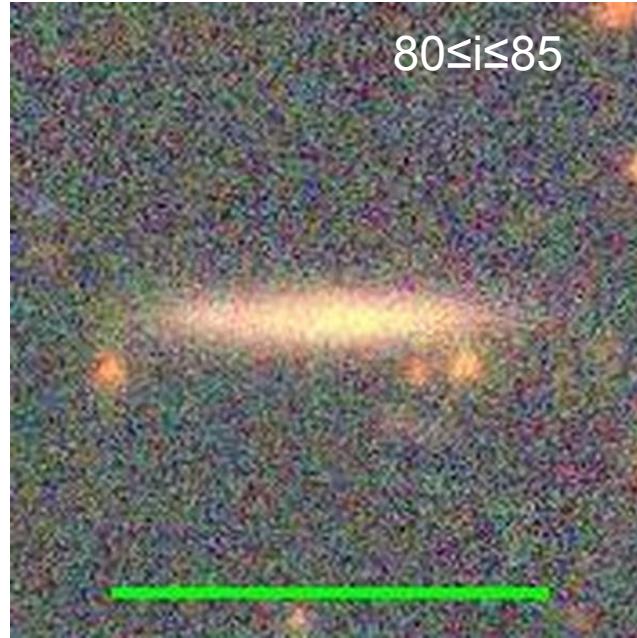
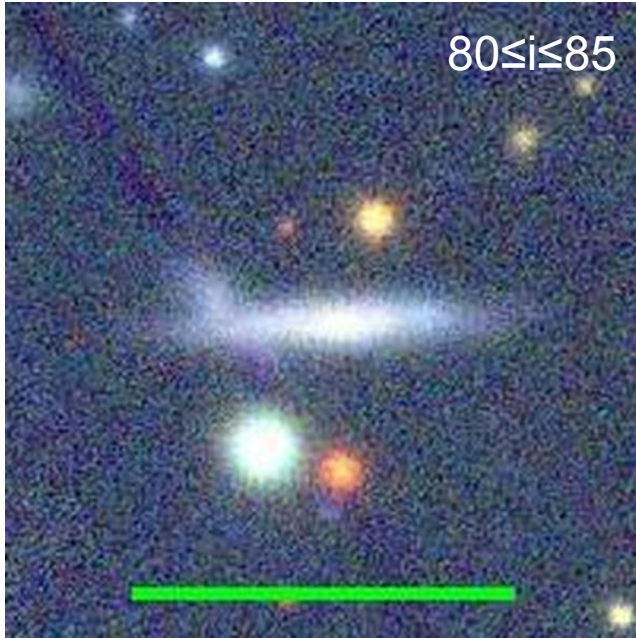
Yes, this is an edge-on galaxy good for analysis.

NOTE THAT WE SELECT GALAXIES WITH $i \geq 80^\circ$, I.E. THEY CAN BE NOT PURE EDGE-ON.

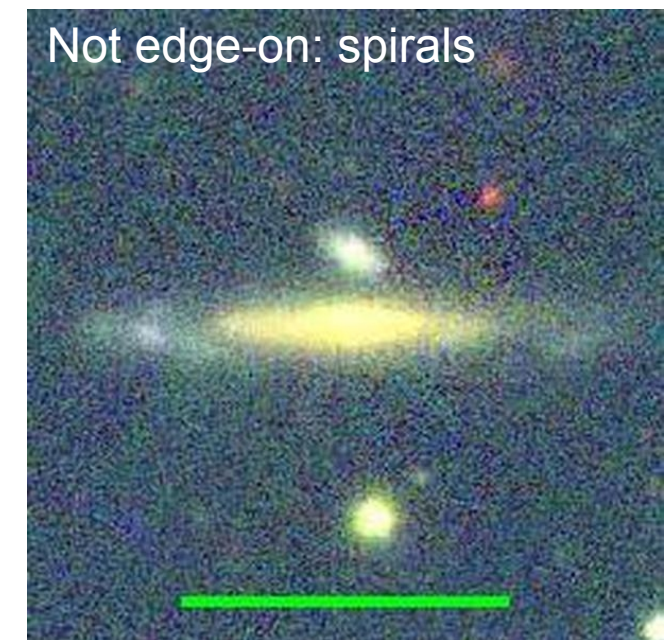
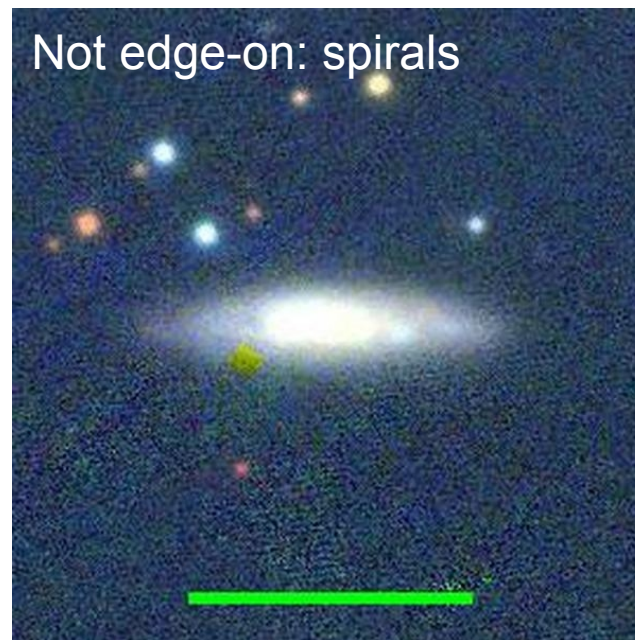
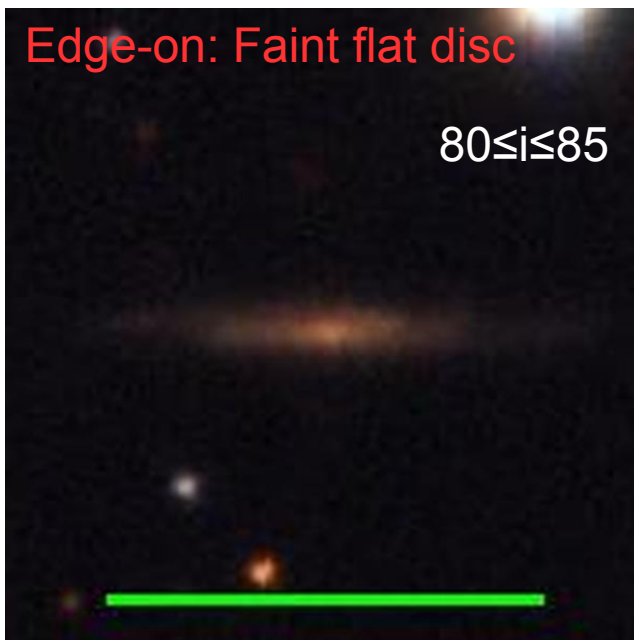
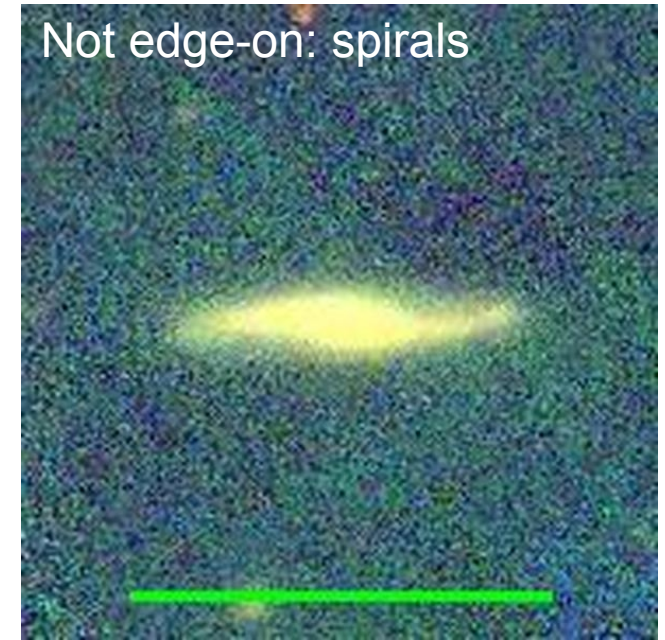
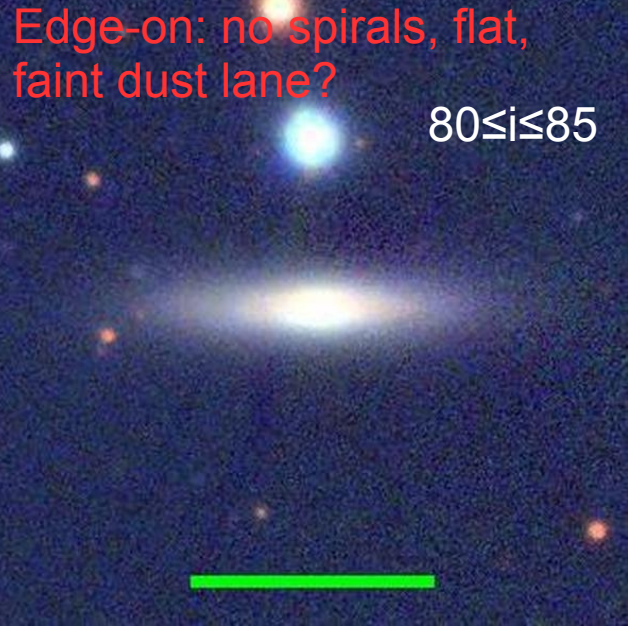


Yes, this is an edge-on galaxy good for analysis.

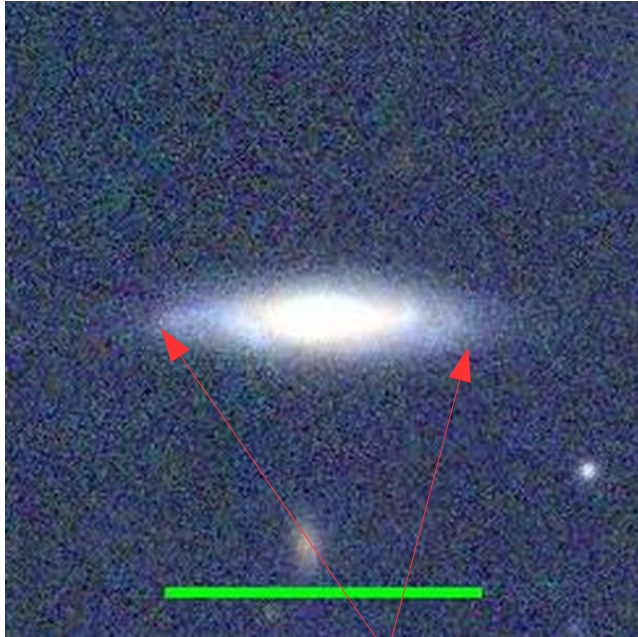
NOTE THAT WE SELECT GALAXIES WITH $i \geq 80^\circ$, I.E. THEY CAN BE NOT PURE EDGE-ON.



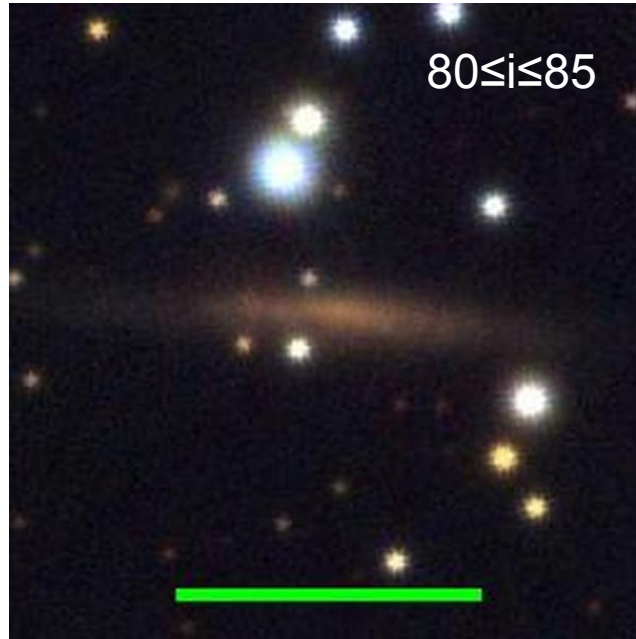
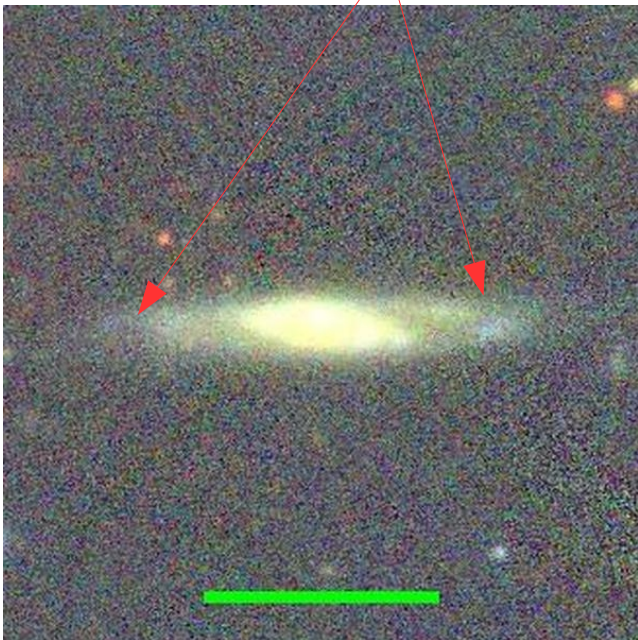
Be careful!



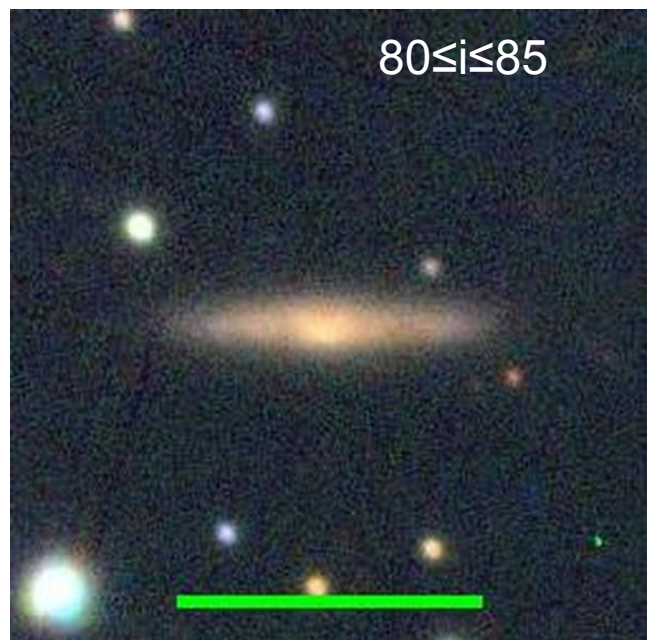
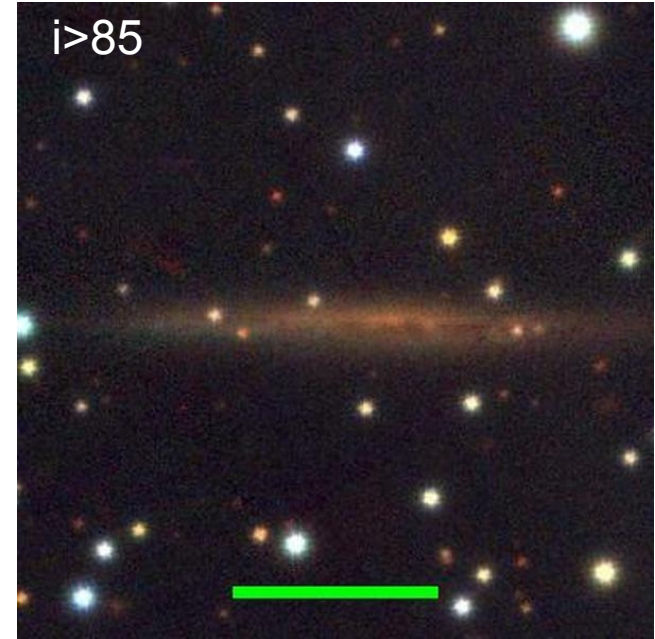
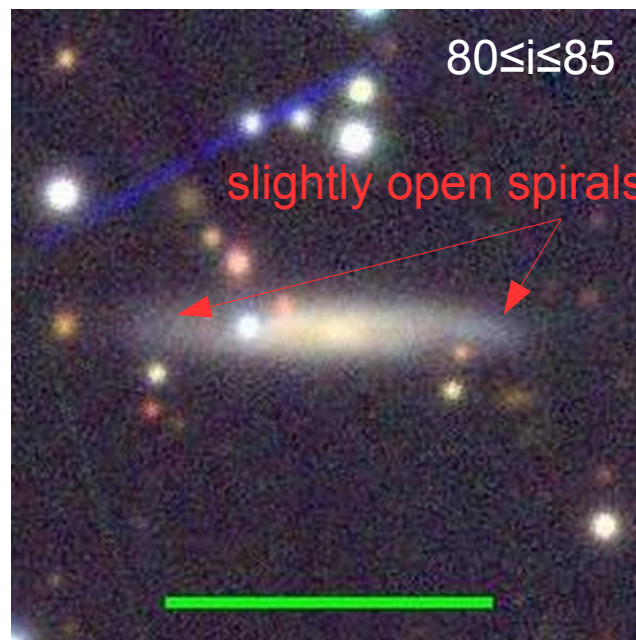
Be careful!



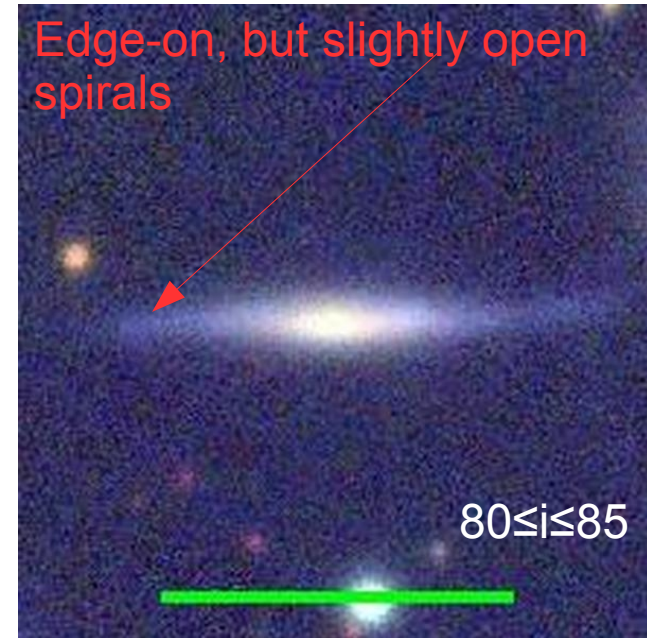
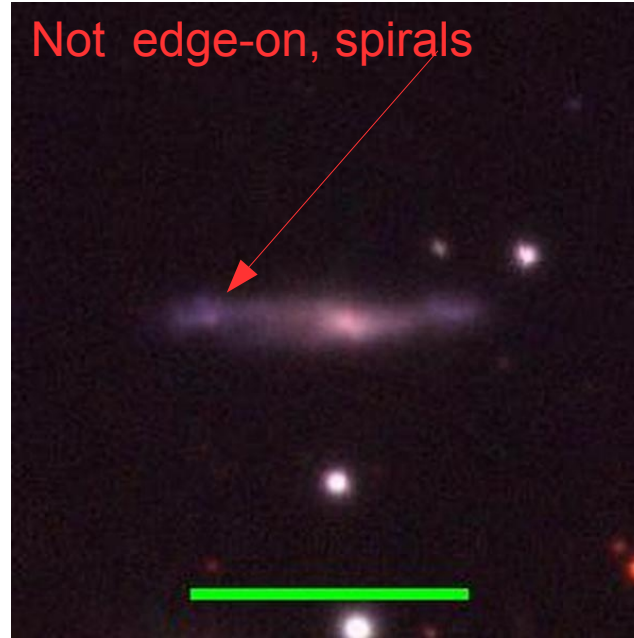
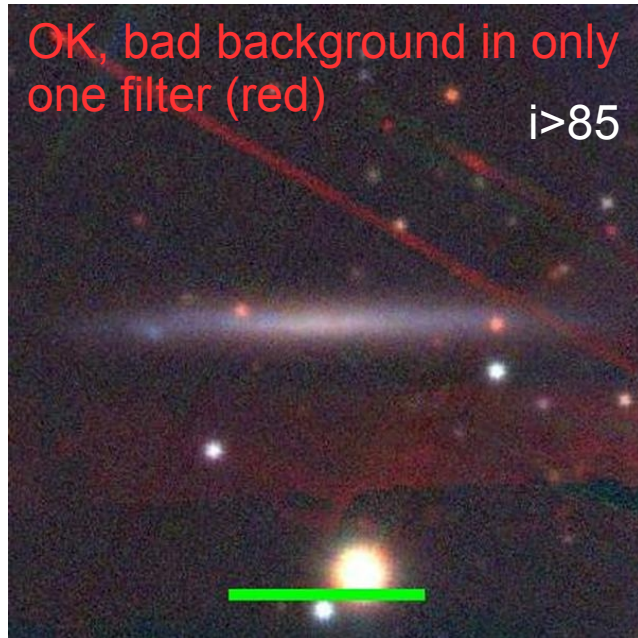
Not edge-on, spirals. Reject



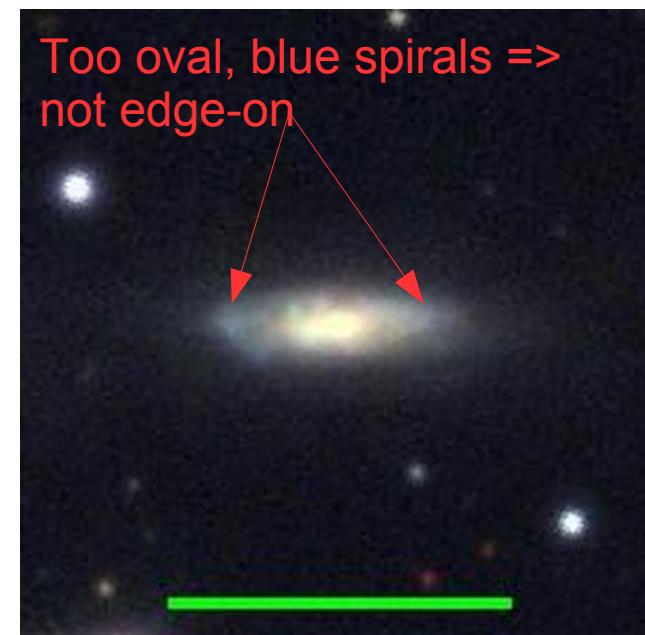
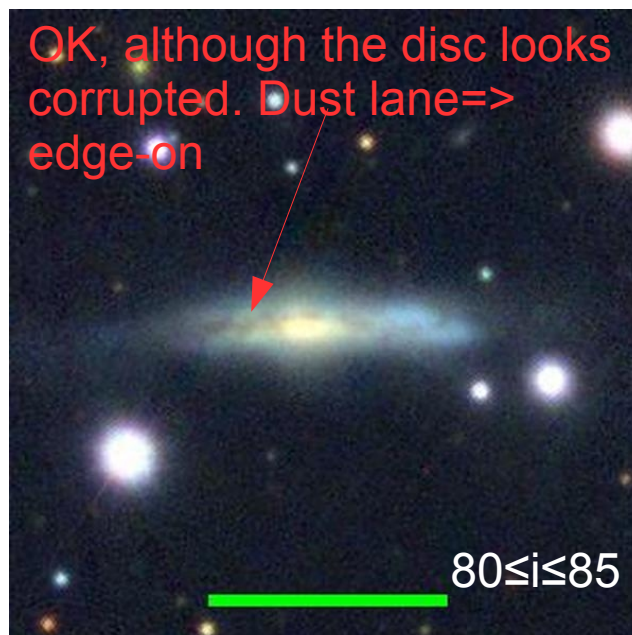
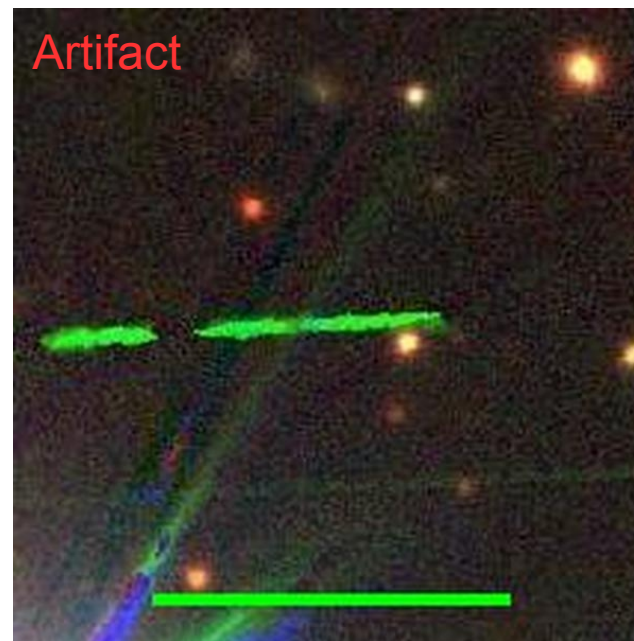
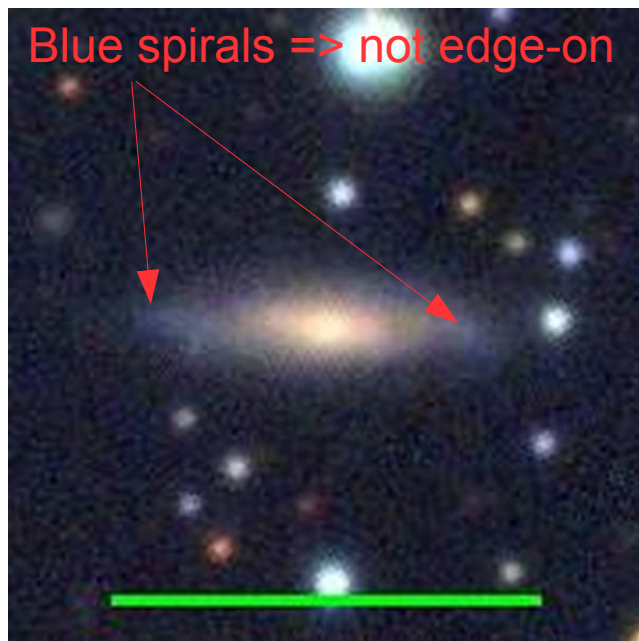
Not so many bright stars, good edge-on



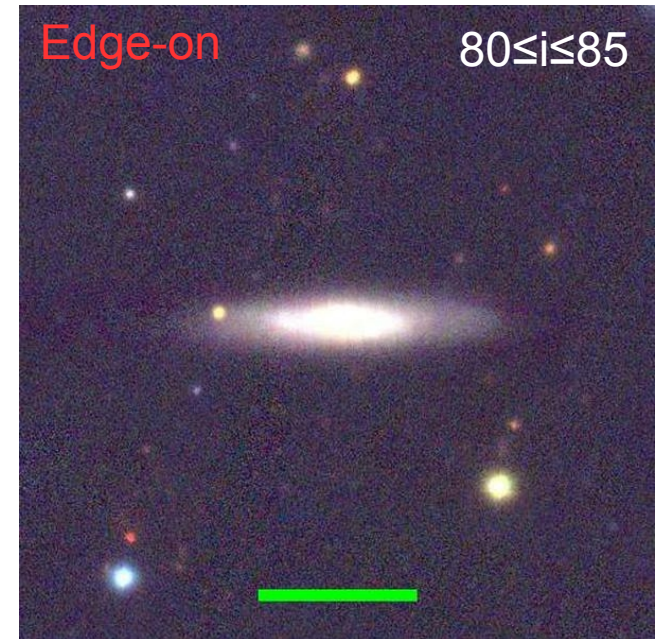
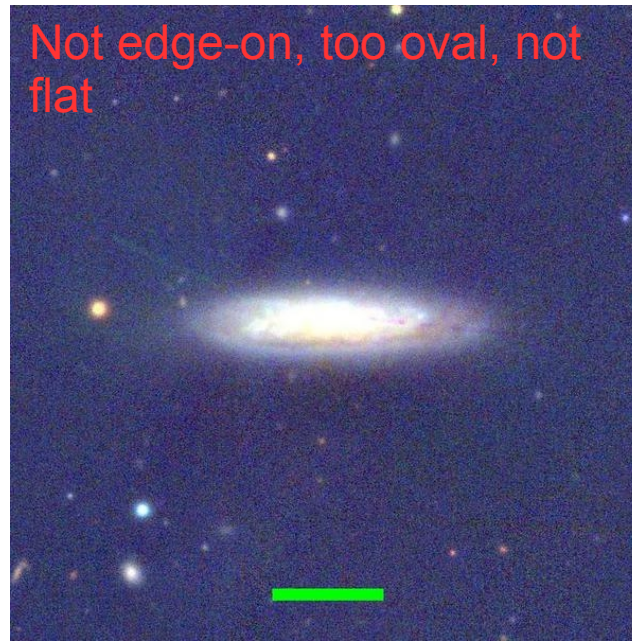
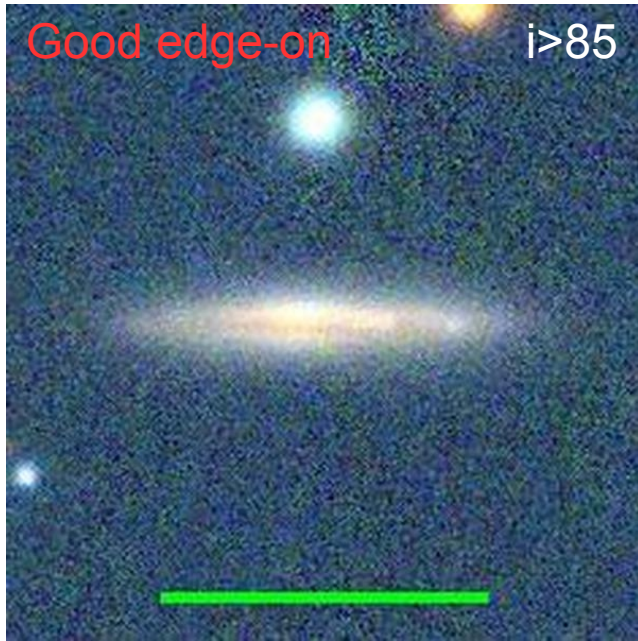
Be careful!



Be careful!



Be careful!



If in doubt, if it's a $80 \leq i \leq 85$ or $i > 85$ edge-on galaxy (due to poor resolution, bad contrast etc.), choose $80 \leq i \leq 85$

