



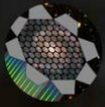
Beautiful Complexity:

Citizen Scientists Help Unlock the Full Potential of the MaNGA Galaxy Survey



ZOO NIVERSE

GALAXY ZOO



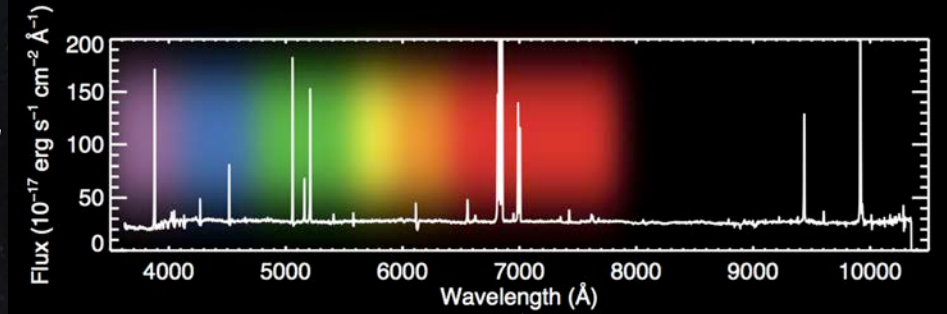
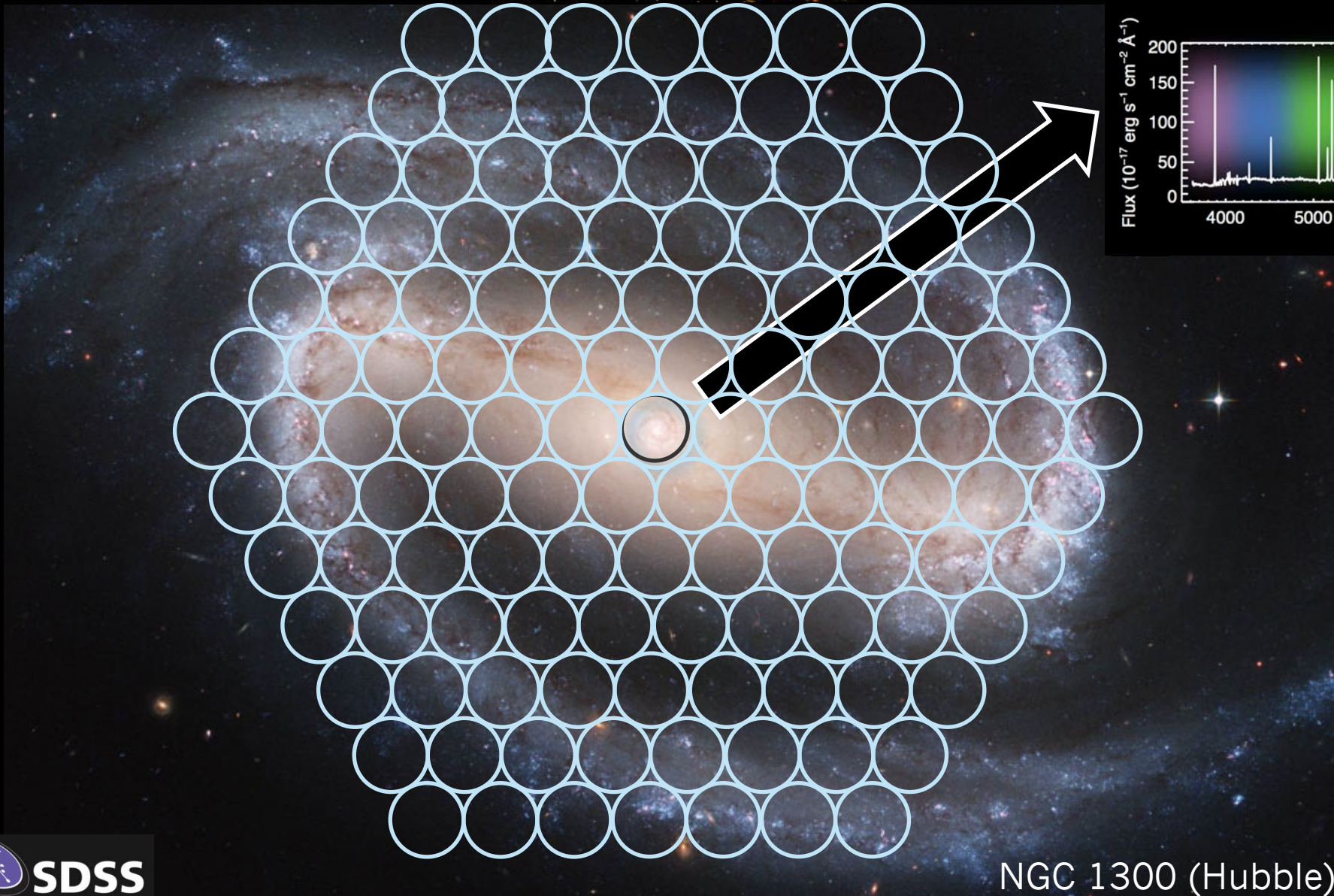
Galaxy Zoo: 3D

[@KarenLMasters](#)

Prof. Karen Masters (she/her) – [iPoster 351.08](#)



SDSS-IV MANGA: a spectral mapping survey



Star

- Ages
- Chemical make-up
- Motions
- Birth sites

Ionized Gas

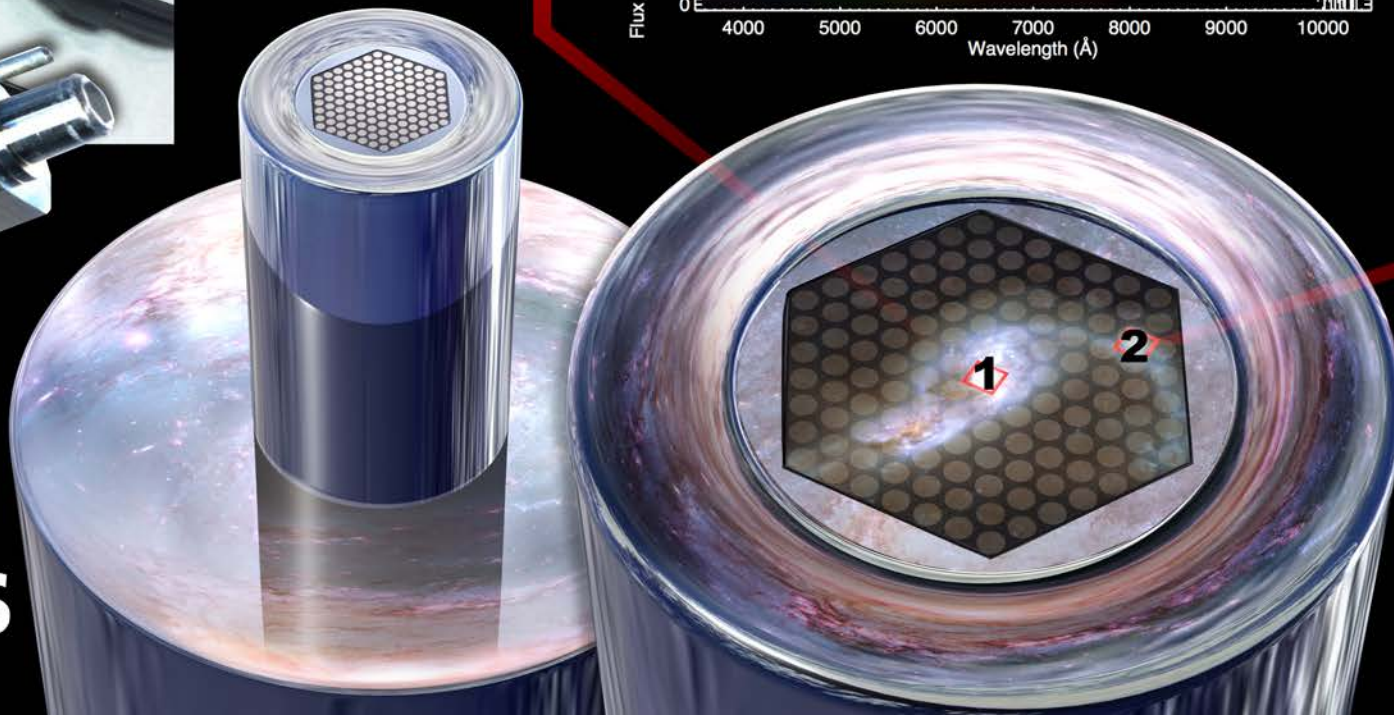
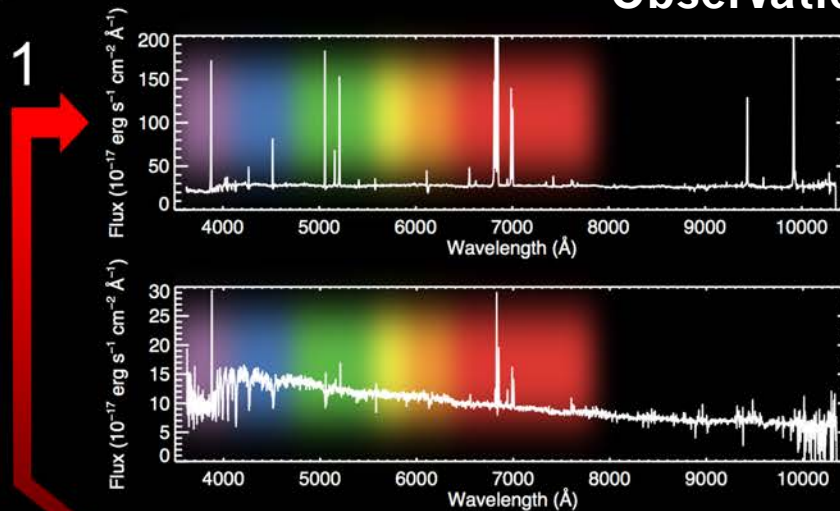
- Amount
- Motions
- Ionization source



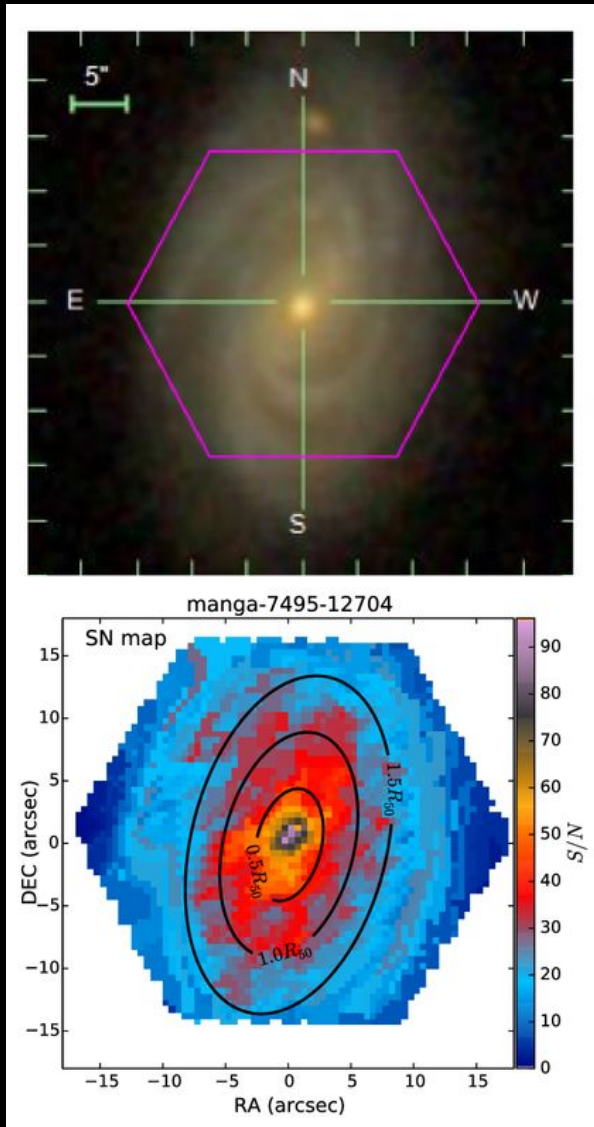
SDSS-IV Dissects 10,000 Galaxies in Nearby Universe



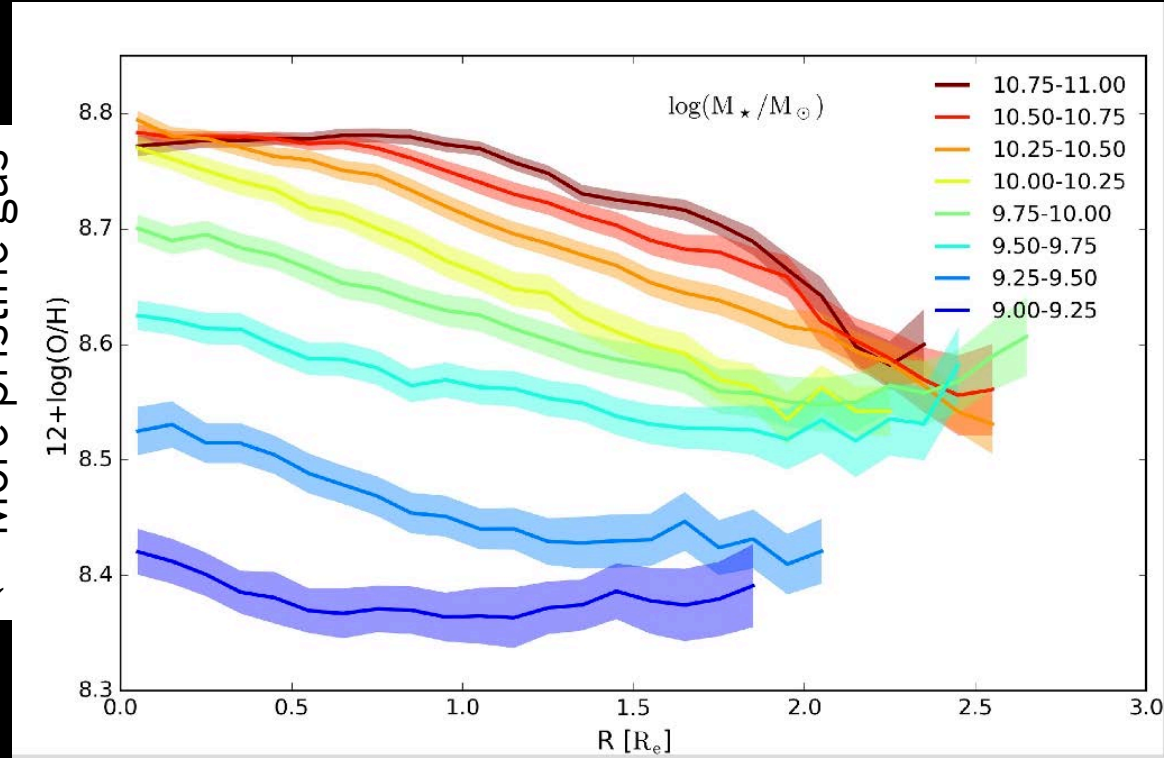
Observations completed
2014-2020



Many Dimensional Data - Lots of Galaxies



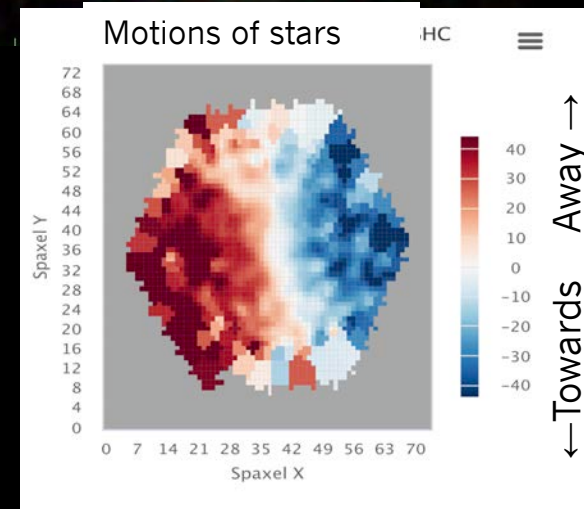
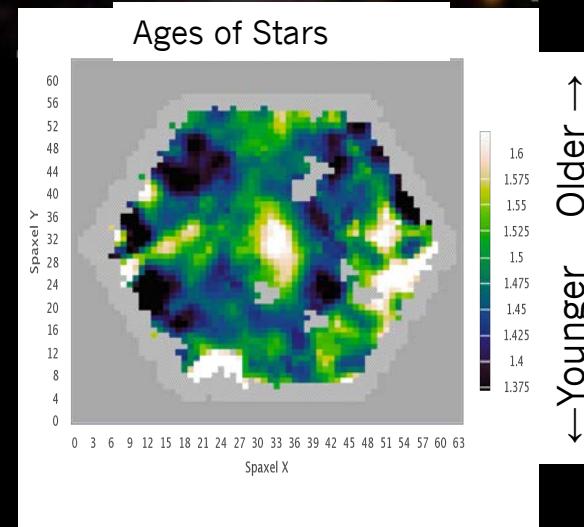
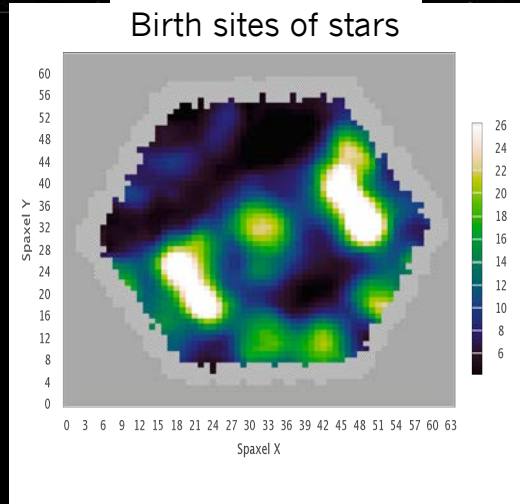
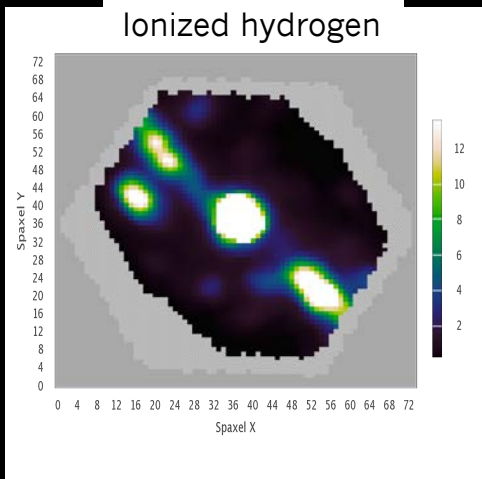
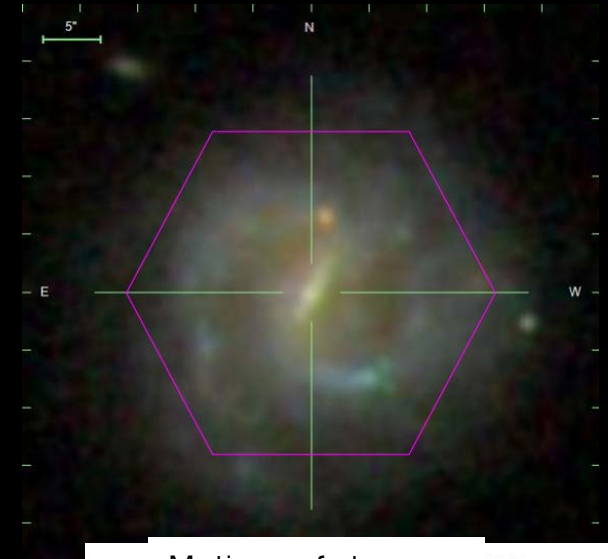
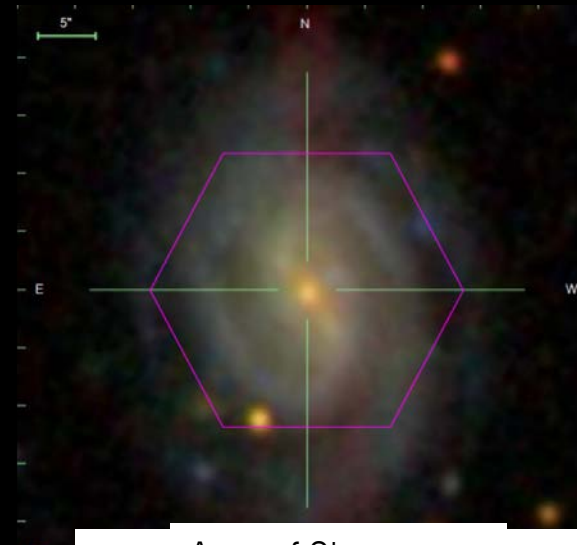
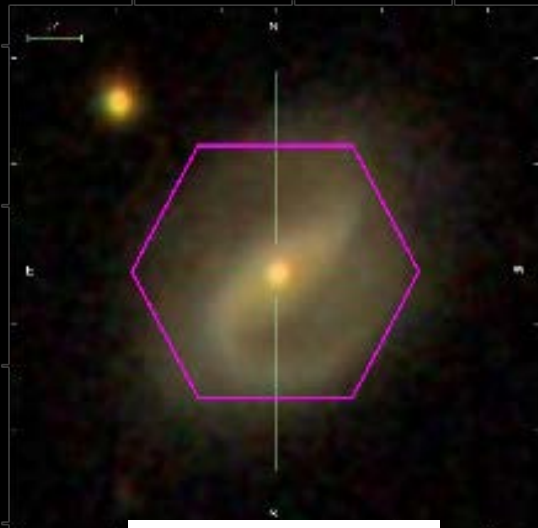
← More pristine gas



Belfiore et al. (2017) - chemical makeup of gas in radial bins

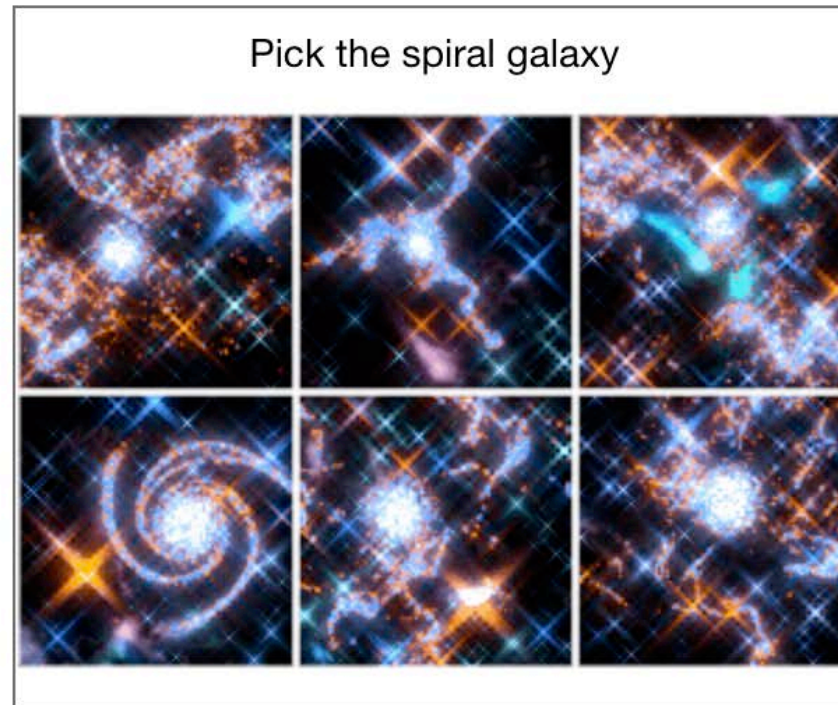
Radial binning example from Ibarra-Medel (2016)

Beautiful Complexity



Automated Detection of Galaxy Features is Limited

Let's do a quick security check



PS. None of these are real spiral galaxies

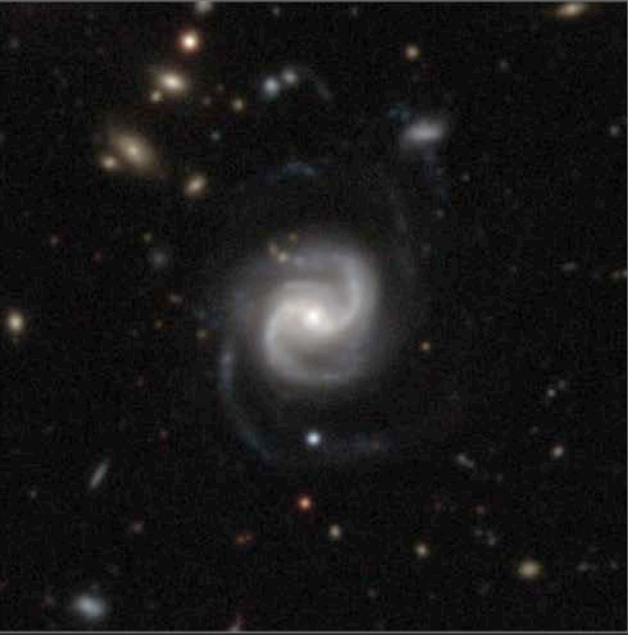
13 years of Galaxy Zoo

Language English

Galaxy Zoo


ABOUT CLASSIFY TALK COLLECT RECENTS LAB


EAGLE galaxies have landed! Read the blog to [find out more about them](#) and [what to do if some of them appear clumpy](#).




TASK **TUTORIAL**

Is the galaxy simply smooth and rounded, with no sign of a disk?

 Smooth

 Features or Disk

 Star or Artifact

NEED SOME HELP WITH THIS TASK?

Next →

FIELD GUIDE



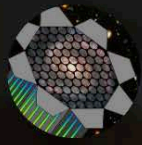
Galaxy Zoo: 3D



SDSS

? → 

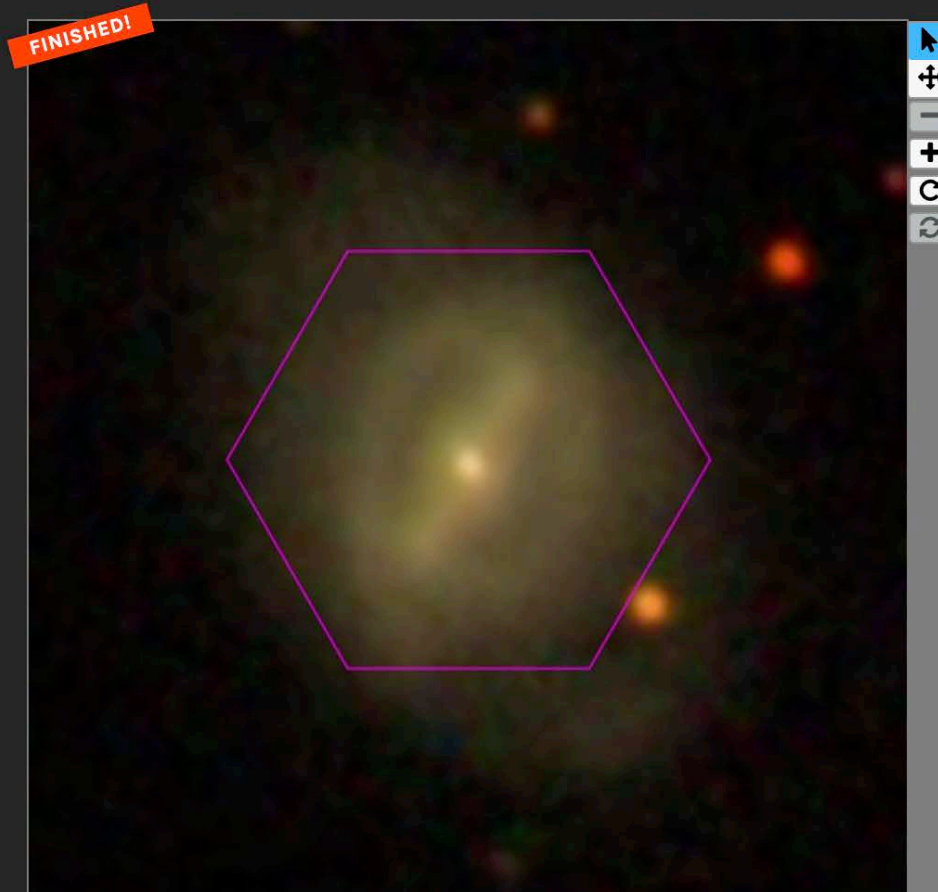
Johnson et al. (2021) - [iPoster about how to use Zooniverse Lab for research](#)



Thanks for the drawings! We are all done with this project. Stay tuned for more results. Meanwhile why not try other galaxy related projects like [Galaxy Zoo](#)

Great work! Looks like this project is out of data at the moment!

[See the results](#) or [dismiss this message](#)



TASK

TUTORIAL

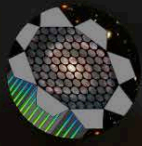
Please mark the spiral arms (even if they go outside the hexagon). If you don't see any spiral arms you can mark click "No spiral arms".

 Spiral arm 0 of 1 required drawn

NEED SOME HELP WITH THIS TASK?

- Hide previous marks
- No spiral arms

[Done & Talk](#)[Done](#)



Thanks for the drawings! We are all done with this project. Stay tuned for more results. Meanwhile why not try other galaxy related projects like [Galaxy Zoo](#)

Great work! Looks like this project is out of data at the moment!

[See the results](#) or [dismiss this message](#)

FINISHED!



TASK

TUTORIAL

Please mark the spiral arms (even if they go outside the hexagon). If you don't see any spiral arms you can mark click "No spiral arms".



Spiral arm

2 of 1 required drawn

NEED SOME HELP WITH THIS TASK?

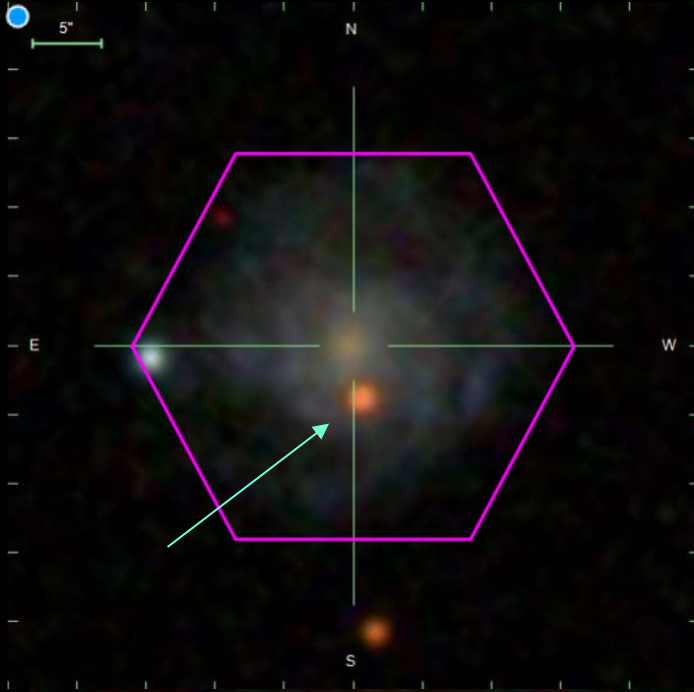
- Hide previous marks (2)
- No spiral arms

Done & Talk

Done

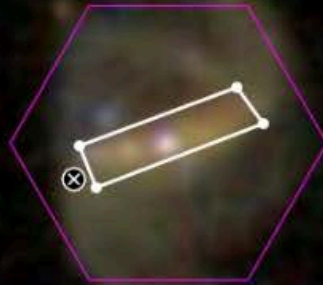


Galaxy Zoo: 3D Tasks

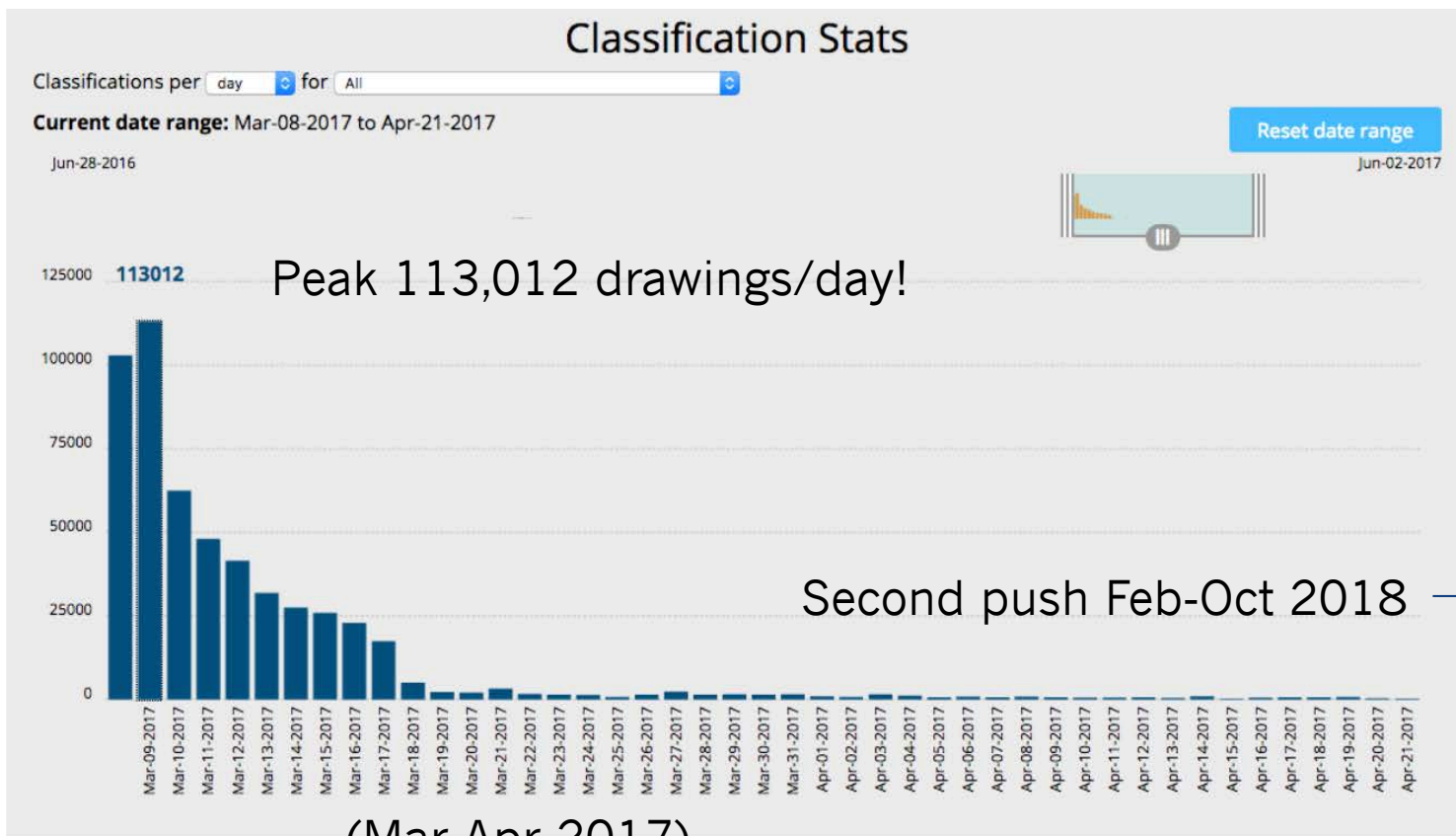


1. Galaxy centers
2. Foreground stars
3. Galactic bars
4. Spiral arms

Galaxy Zoo Morphologies
used for pre-selection of
bars and spirals



Volunteer Rate

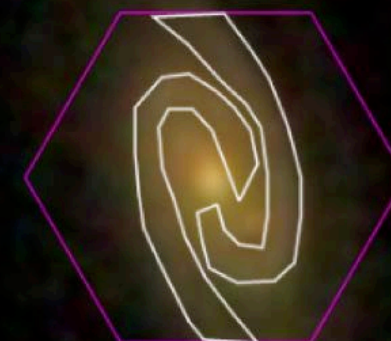


(Mar-Apr 2017)

8443 registered volunteers

113,395 separate drawings

15 drawings for each task on each galaxy



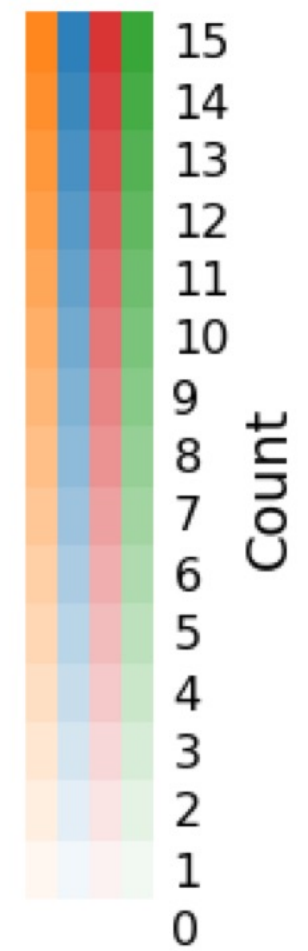
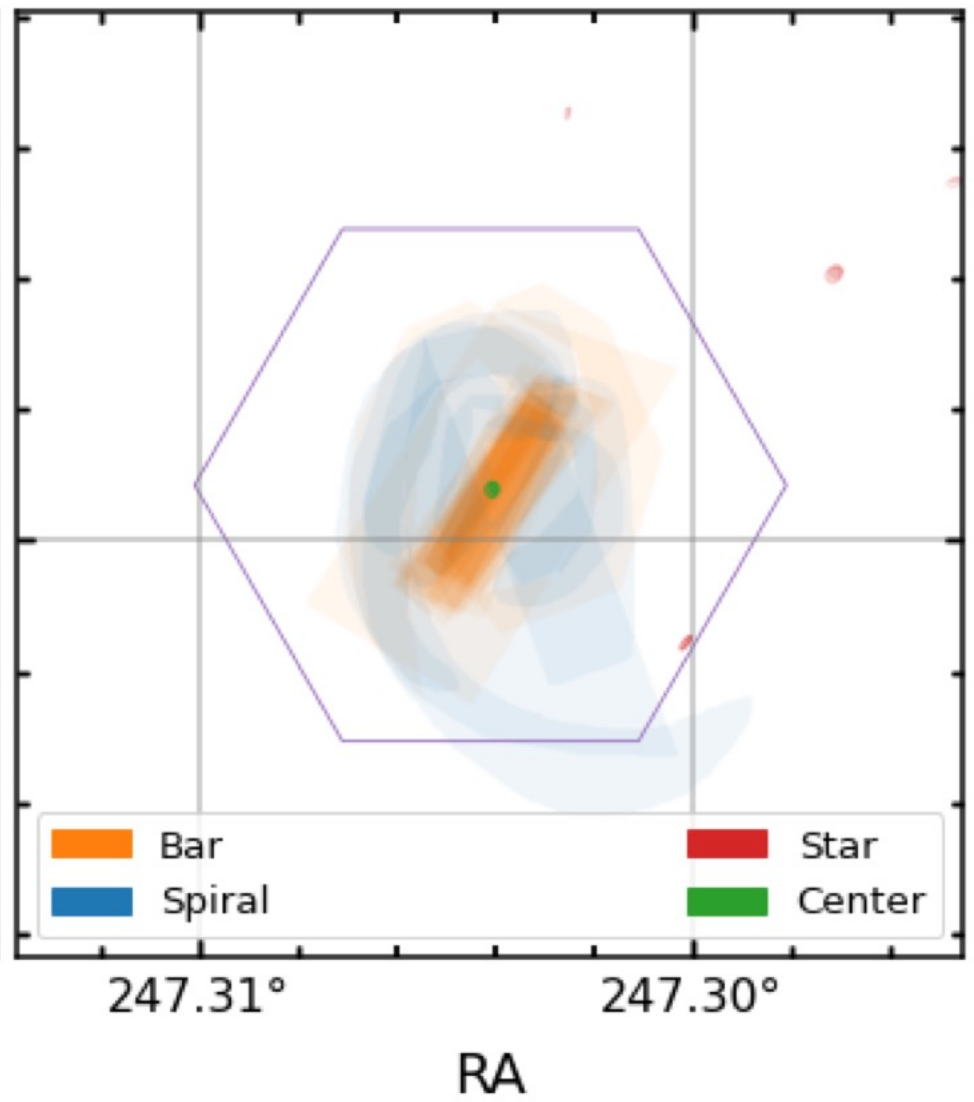
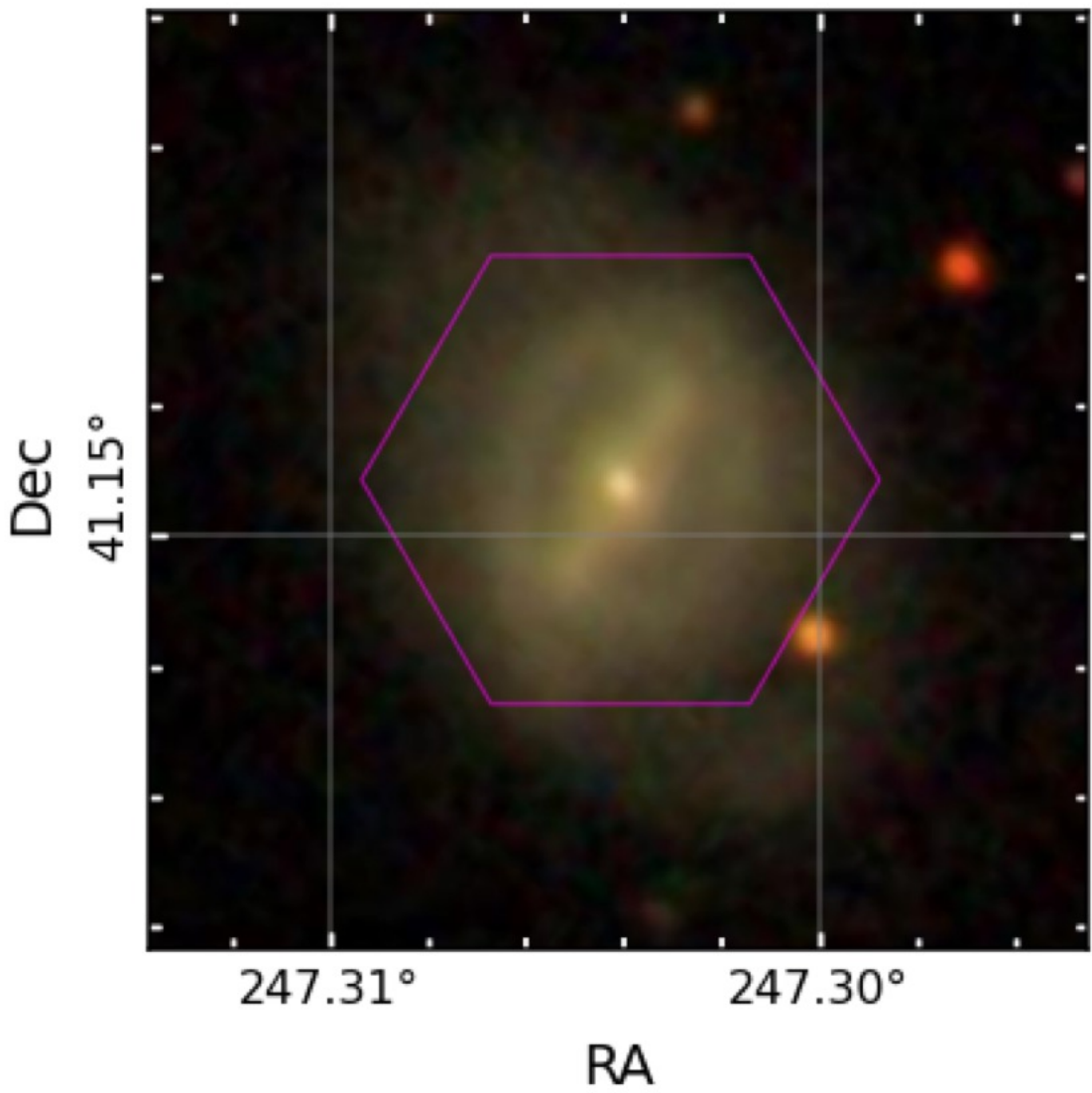
Stats

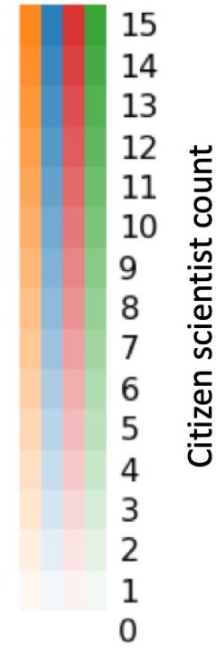
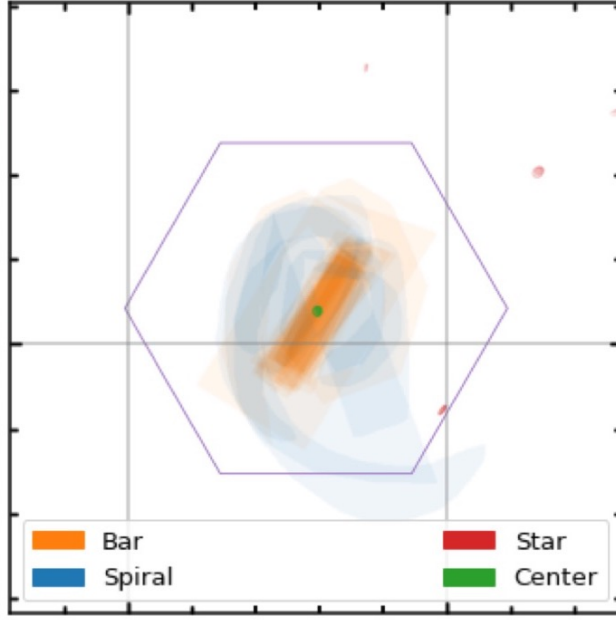
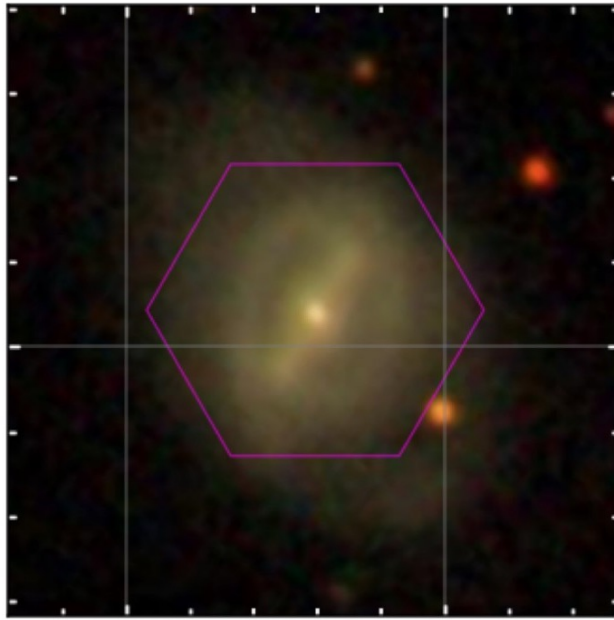
The easy task finished in one week, the medium task finished one day later, the hard task took 6 weeks.



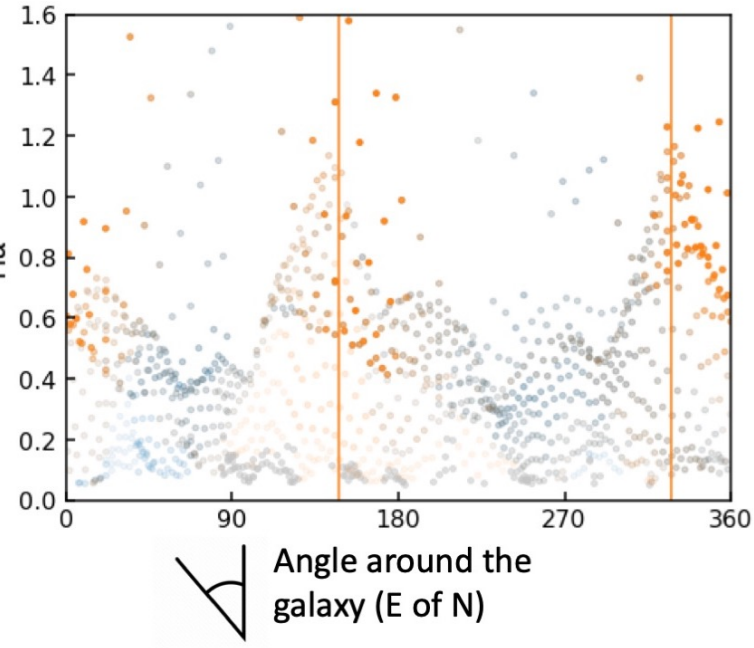
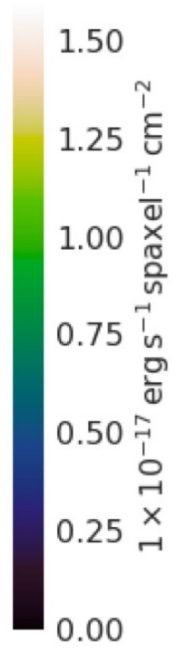
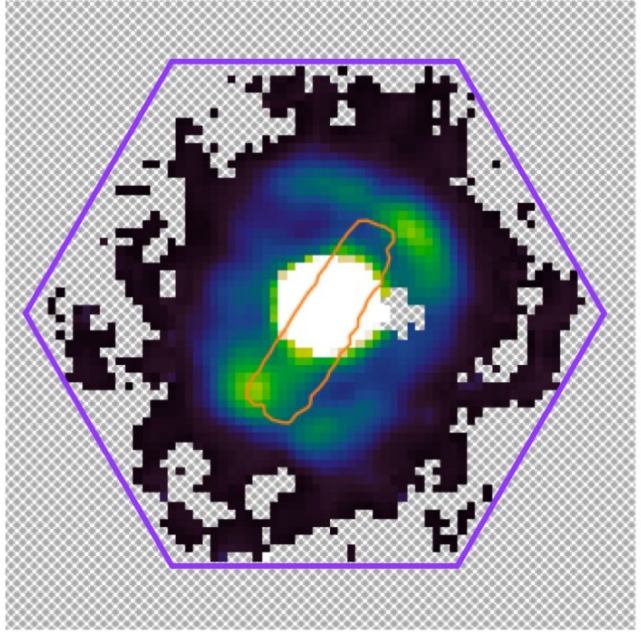
Result for One Galaxy

MaNGA ID 1-633990





Citizen scientist count



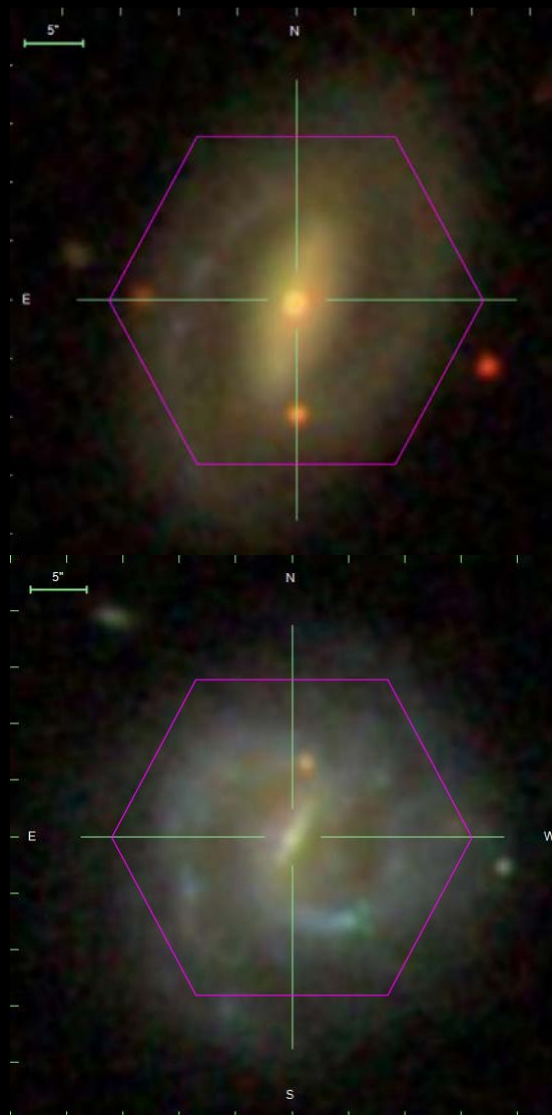
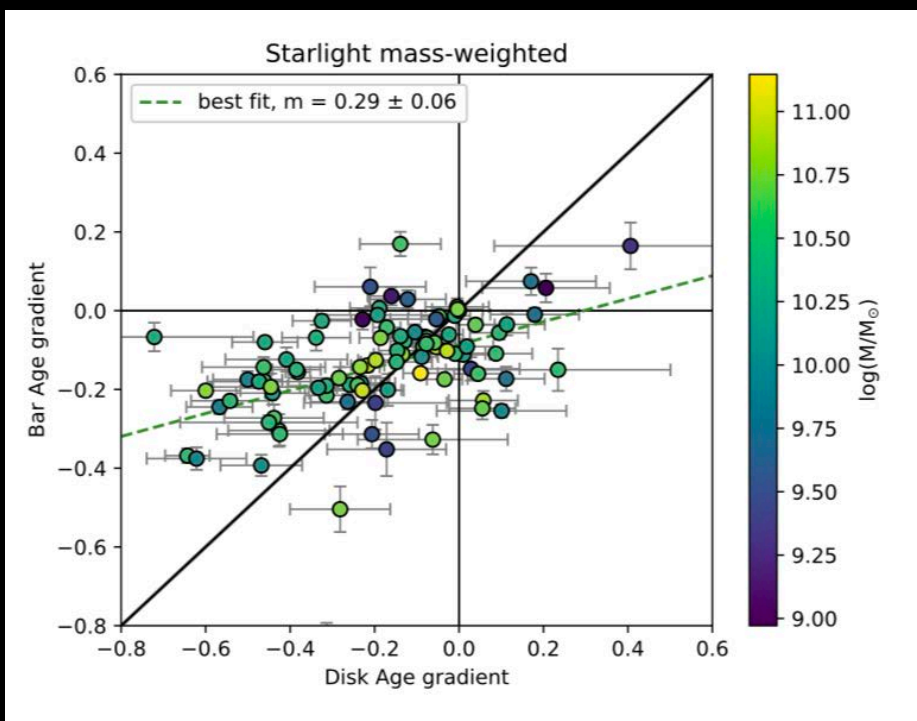
Angle around the galaxy (E of N)

Combining Multiple Galaxies

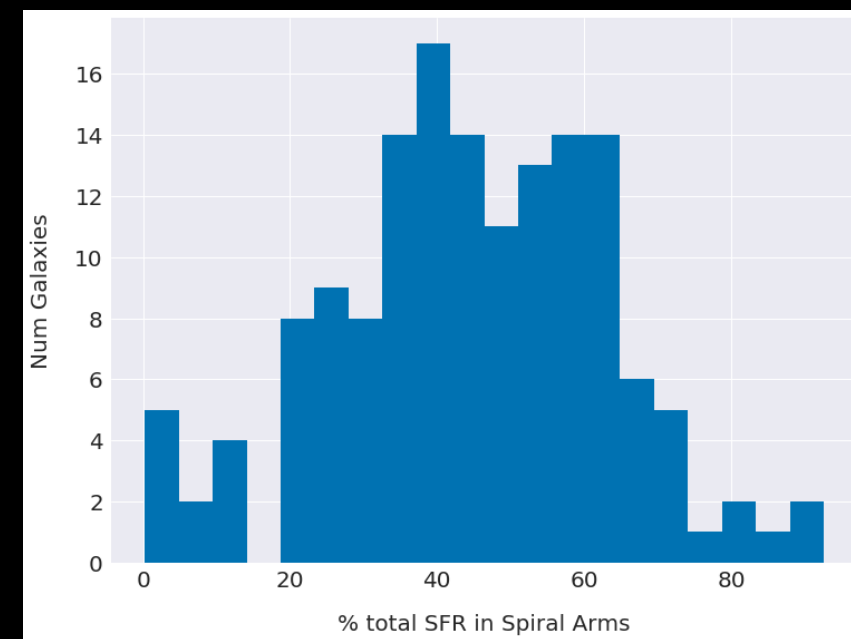
Bars mix up stars:

- 128 barred galaxies
- Flatter radial age gradients in bars than in disk

(Fraser-McKelvie et al. 2019)



About half (40-60%) of stars form in spiral arms



(Shamsi et al. 2021 [iPoster 351.07](#))



Summary:

- Crowdsourced feature masks are available for all 10,000 galaxies in the SDSS-IV MaNGA survey
 - A step towards using all the beautiful complexity in the MaNGA data
- Plan to release in the final data release of MaNGA (Dec 2021)

Masters et al. in prep (to be submitted in 2021)