



# Galaxy Zoo: Cosmic Dawn

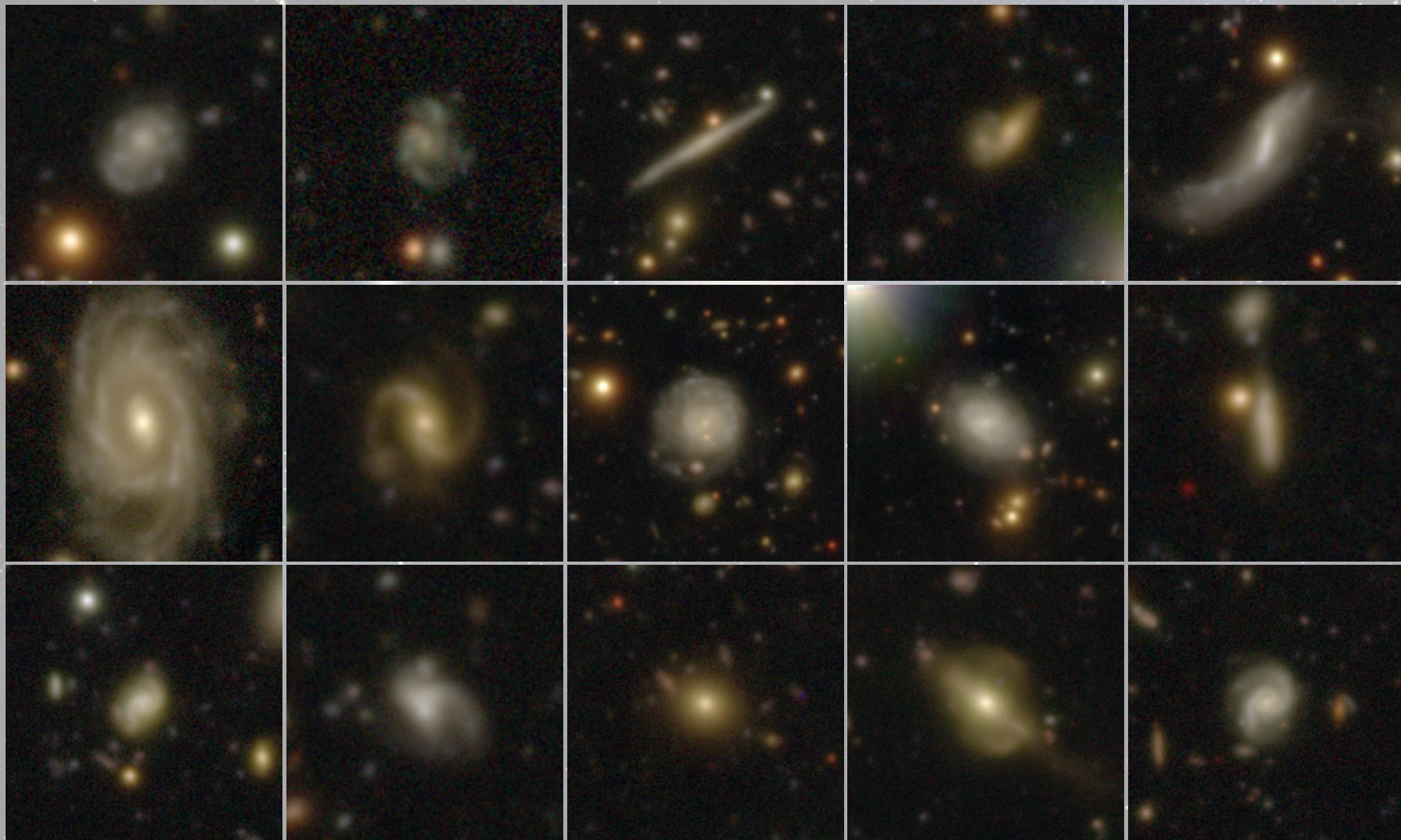
James Pearson, Hugh Dickinson,  
Stephen Serjeant

Galaxy Zoo Team

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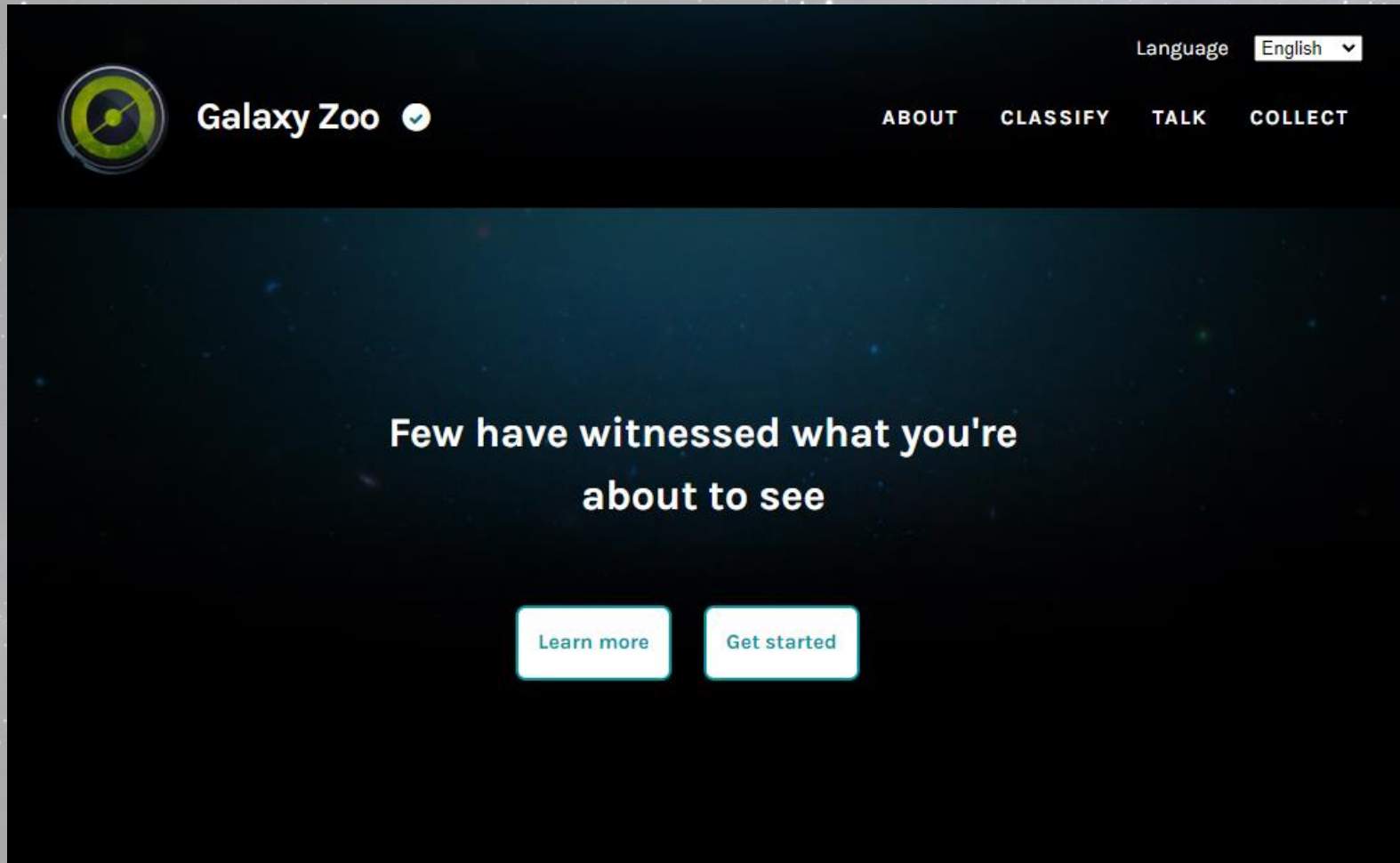


# Galaxy Zoo





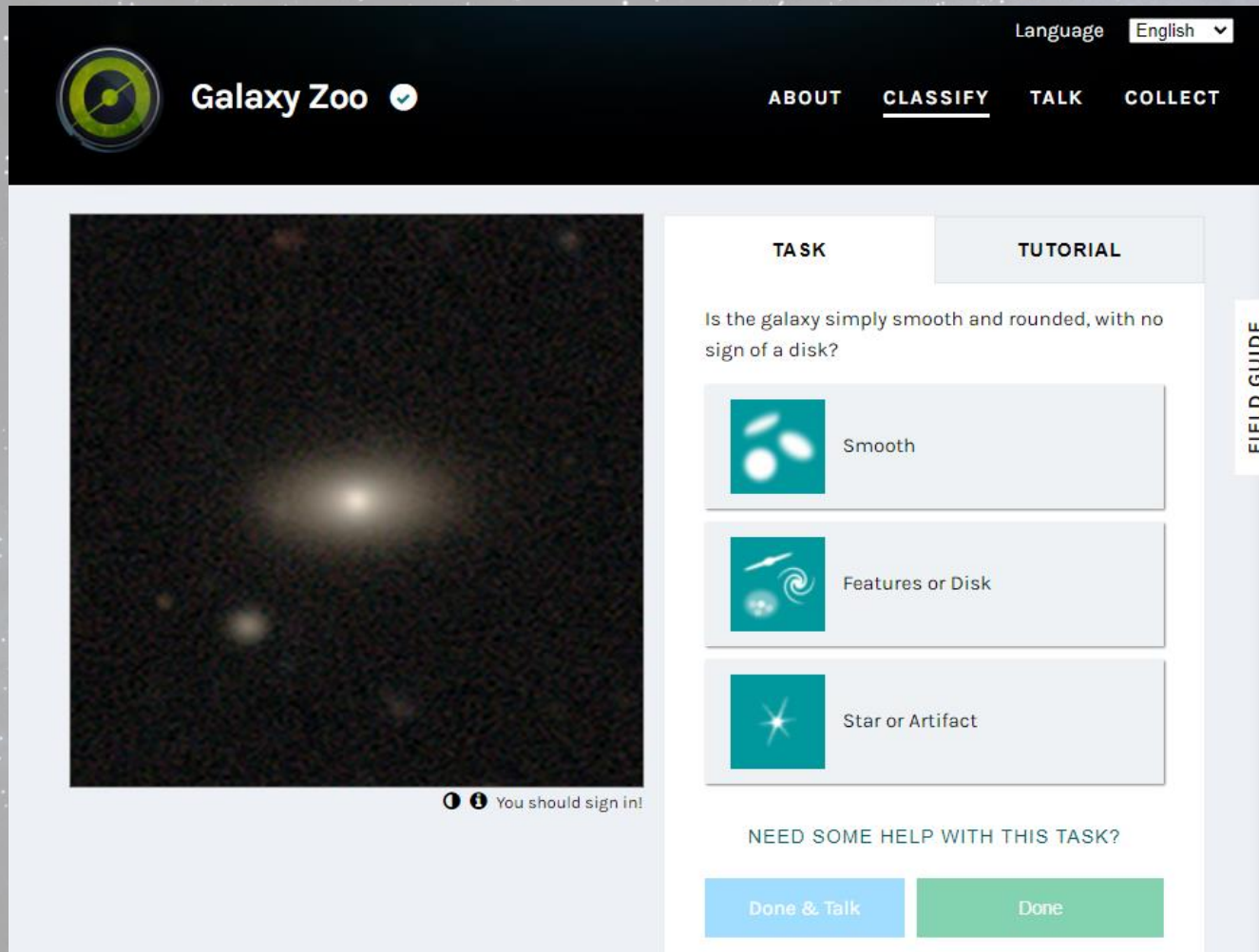
# Galaxy Zoo



The screenshot shows the Galaxy Zoo website homepage. At the top left is the Galaxy Zoo logo, a green and yellow circular emblem with a white arrow. To its right is the text "Galaxy Zoo" followed by a small white checkmark icon. In the top right corner, there is a "Language" dropdown menu set to "English". Below the logo and text is a navigation bar with four links: "ABOUT", "CLASSIFY", "TALK", and "COLLECT". The main content area features a dark blue background with a starry pattern. Centered in this area is the text "Few have witnessed what you're about to see" in white. Below this text are two white buttons with rounded corners: "Learn more" and "Get started".

<https://www.zooniverse.org/projects/zookeeper/galaxy-zoo>

# Galaxy Zoo



The screenshot shows the Galaxy Zoo website interface. At the top, there is a navigation bar with the Galaxy Zoo logo, the text "Galaxy Zoo", and a language dropdown menu set to "English". Below the logo, there are navigation links for "ABOUT", "CLASSIFY", "TALK", and "COLLECT".

The main content area is divided into two sections: "TASK" and "TUTORIAL". The "TASK" section displays a large image of a galaxy. Below the image, there is a notification: "You should sign in!".

The "TUTORIAL" section contains the question: "Is the galaxy simply smooth and rounded, with no sign of a disk?". Below this question are three classification options, each with a corresponding icon:

- Smooth
- Features or Disk
- Star or Artifact

At the bottom of the "TUTORIAL" section, there is a link: "NEED SOME HELP WITH THIS TASK?". Below this link are two buttons: "Done & Talk" and "Done".

On the right side of the interface, there is a vertical sidebar labeled "FIELD GUIDE".

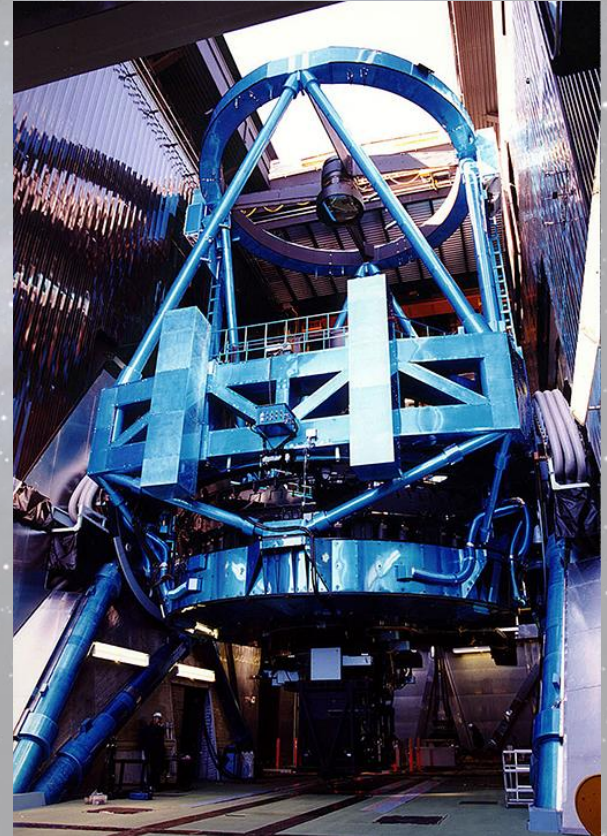
<https://www.zooniverse.org/projects/zookeeper/galaxy-zoo>

# Galaxy Zoo: Cosmic Dawn

**Citizen science galaxy classification** using Subaru **Hyper Suprime-Cam (HSC)** imaging in the Euclid Deep Field North (EDF-N), with data from the **Hawaii Two-0 (H20) Cosmic Dawn** survey.

## Cosmic Dawn

- A 50 sq deg multi-wavelength survey of the Euclid Deep and Calibration fields – some of the darkest and most observable fields on the sky.
- Aims to understand the co-evolution of galaxies, black holes, and the dark matter haloes that host them from reionization to the present.



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TWO-0

COSMIC  
DAWN  
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# Galaxy Zoo: Cosmic Dawn

## H20

- Covers 20 sq. deg. of the two primary Euclid deep calibration fields (Euclid Deep Field North and Chandra Deep Field South).
- Studying galaxy evolution out to  $z = 7$  (<800 million years since the Big Bang).
- Includes ultra-deep Subaru HSC imaging, containing about a million galaxies per square degree.

## Galaxy Zoo project

- Focusing on deep multiband imaging of the 10 sq. deg. of the EDF-N.
- Implemented as hundreds of thousands of colour postage stamp cutouts.



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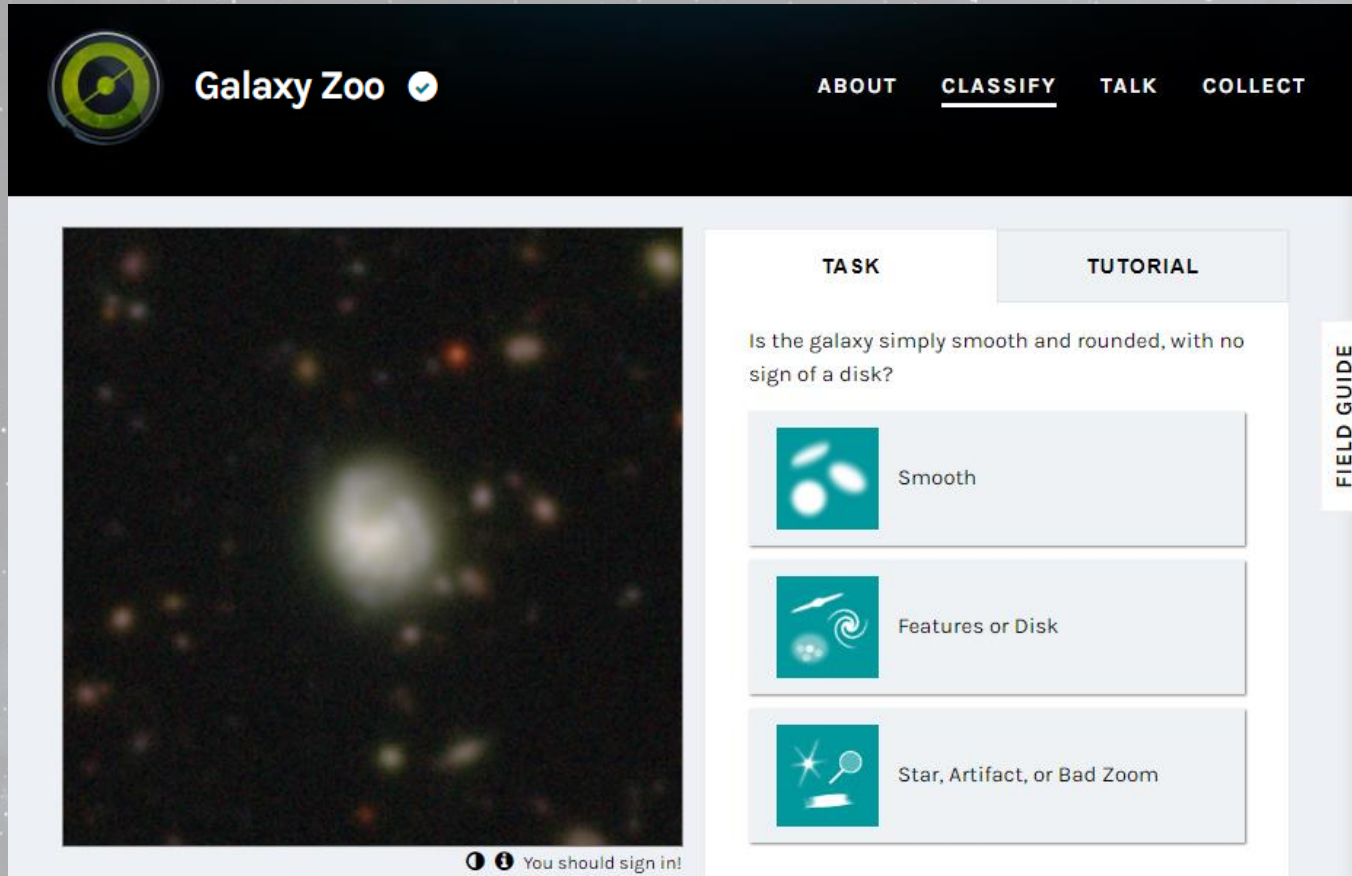
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COSMIC  
DAWN  
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# Galaxy Zoo: Cosmic Dawn



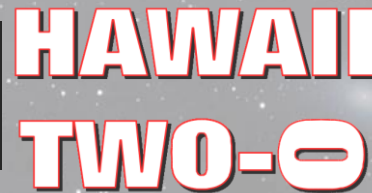
The screenshot shows the Galaxy Zoo website interface. At the top left is the Galaxy Zoo logo, a green and blue circular icon with a white checkmark. To its right is the text "Galaxy Zoo" with a white checkmark. Further right are navigation links: "ABOUT", "CLASSIFY" (underlined), "TALK", and "COLLECT".

The main content area is divided into two sections. On the left is a large image of a galaxy, which is smooth and rounded. Below the image is a small icon of a person and the text "You should sign in!".

On the right is a classification task interface. It has two tabs: "TASK" (selected) and "TUTORIAL". Below the tabs is the question: "Is the galaxy simply smooth and rounded, with no sign of a disk?". There are three options, each with a teal icon and a text label:

- Smooth**: Icon shows two smooth, rounded galaxies.
- Features or Disk**: Icon shows a galaxy with a spiral arm and a central feature.
- Star, Artifact, or Bad Zoom**: Icon shows a star and a magnifying glass over a blurry galaxy.

On the far right, there is a vertical label "FIELD GUIDE".



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# Galaxy Zoo: Cosmic Dawn

Galaxy Zoo

Are there any obvious bright clumps?

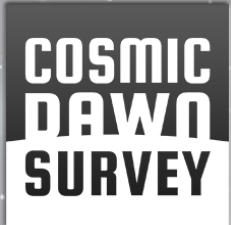
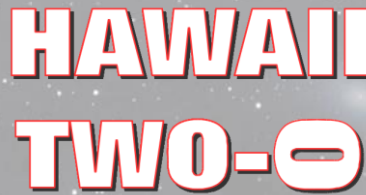
- Bright clumps
- None
- Lens or arc

What problem do you see with the image?

- Star
- Non-star Artifact
- Bad Image Zoom

What type of artifact is it?

- Saturation Feature (Bleed Trail)
- Diffraction Spike
- Satellite Trail
- Cosmic Ray
- Scattered Light
- Other / Not Sure

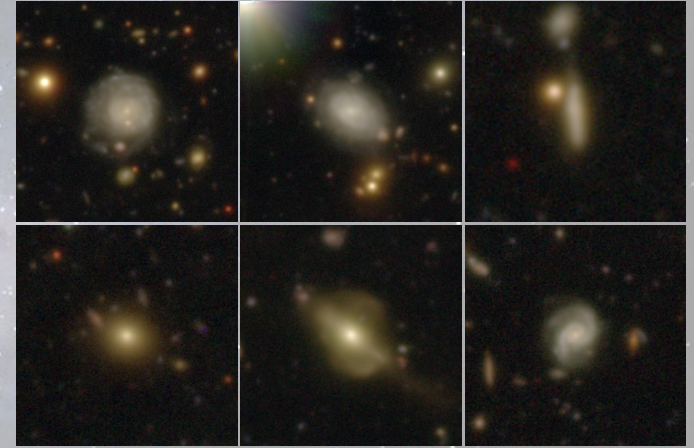




# Galaxy Zoo: Cosmic Dawn

## Potential Publications

- General data release paper
- Strong gravitational lens discoveries
- Clumpy galaxy statistics
- Low surface brightness features
- Barred galaxy discoveries and statistics
- Interesting cases of utilising machine learning (Zoobot)
- Galaxy mergers identified by GZ, and their correlation with AKARI/Spitzer data
- Correlations between Galaxy Zoo morphology and IR luminosity



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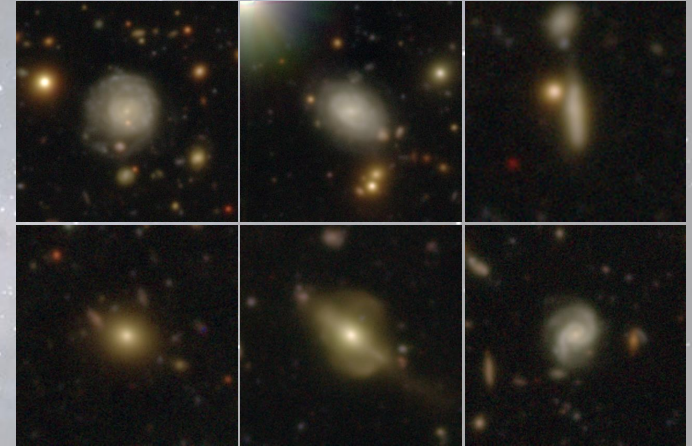


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# Galaxy Zoo: Cosmic Dawn

## Benefits

- Euclid precursor (and others): mapping the EDF-N provides **initial classifications for rapid follow-up** of the most interesting objects.
- LSST Rubin precursor: mapping provides **multiband ground truth sets** for use in training deep learning models.
- Higher-end resolution and deep multiband imaging for statistically studying both **higher redshift sources** and **low surface brightness features**.
- Expands the lists of interesting objects, including those from **serendipitous discovery**.



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# Galaxy Zoo: Cosmic Dawn

## Summary

- Galaxy Zoo is the longest running Zooniverse citizen science project, classifying galaxies based on their visual morphologies.
- Galaxy Zoo: Cosmic Dawn forms its next iteration, using deep multi-band Subaru HSC imaging of the 10 sq. deg. EDF-N, with data from the H20 Cosmic Dawn survey.
- Partly supported by the ESCAPE project, it is in the final stages prior to public launch, awaiting the initial 6 sq. deg. subject set.
- Benefits include studying higher-z sources and those with LSB features, as well as expanding the list of interesting objects (e.g. through serendipitous discovery).
- Mapping the EDF-N also acts as a precursor for Euclid and Rubin LSST, providing initial classifications for rapid follow-up, and multiband ground truth sets for training deep learning models.

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