

Citizen Science Projects

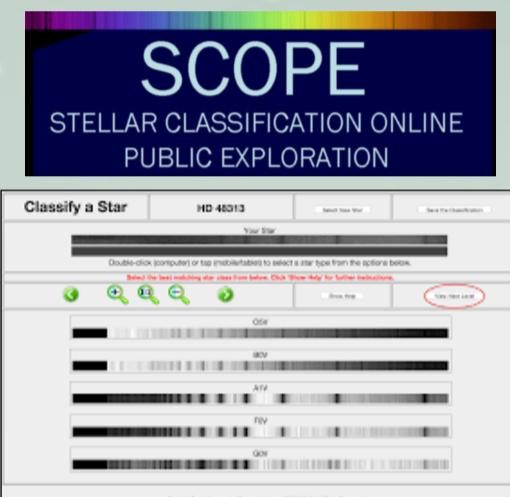
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We present three citizen science projects, focusing on classification of astronomical objects. The service is free and open to everyone. Moreover, this kind of activity can be used as a didactical in-class, hands-on exercise to deepen and enhance the understanding of the material presented.



1. SCOPE – Stellar Classification Online Publication Explorer

Always wanted to walk in the historic footprints of William and Margarit Huggins, Cecila Payne and Annie J. Cannon? Login to the SCOPE project and start classifying stars according to their spectral fingerprints. After picking a star you will be given the task to compare the observed stellar spectrum with a range of known template spectra ranging from hot O- to cold M-type stars.

The spectra differ in the occurrence of certain spectral features. Your aim is to identify prominent lines. The project allows you to dive into the science of spectroscopy and learn about thermal properties of stars. The data you will examine were taken over the past 100 years and are archived at the Pisgah Astronomical Research Institute (PARI).



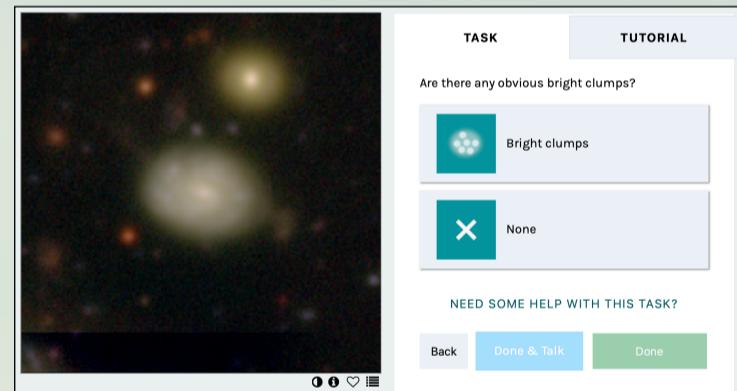
2. Galaxy Zoo – the looks of a galaxy

Galaxies come in many shapes, sizes, and colours. While most properties can be quantified in an absolute way, the appearance – or *morphology* – is of more subjective nature. Nevertheless, understanding the morphology of galaxies can lead to important physical insight.

Rather than relying on a few people's personal preferences, astronomers therefore seek help from you: The Hawaii Two-O (H2O) Survey – a key



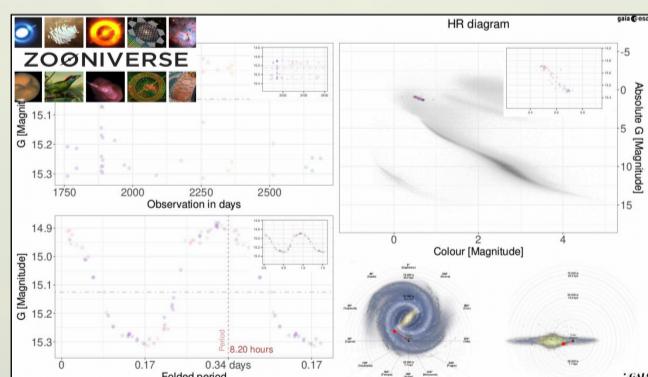
component of the Cosmic Dawn Survey (PI: Sune Toft) – has observed tens of millions of galaxies. At Galaxy Zoo, you and fellow citizen scientists can browse through the H2O catalogue of galaxies. Based on the users' answers to a number of questions, a galaxy can then be classified as a e.g. flocculent spiral, an elliptical, or a dwarf irregular.



3. GAIA VARI – Classification of stellar variables

GAIA is a space-telescope developed by ESA. The main scientific goal of GAIA is to measure astrometric distances and radial velocities of stars in the Milky Way. This allows a for a full 6D-mapping of positions and kinematics of nearly 2 billion stars. A total of three instruments are on-board.

As part of the survey, GAIA has accumulated a large dataset describing the brightness changes of stars. Your task is to classify variable stars. After an initial training you will be looking for certain types of brightness changes in combination with knowledge on where the star is in



its current evolutionary stage as seen in a Hertzsprung-Russell (color-magnitude) diagram. You will learn how to differentiate between a RR Lyrae (RR) and Cepheid (CEP) type variable and identify eclipsing binaries (ECL) and otherwise long-period variable (LPV) stars by looking at their changes in period, changes in brightness and their colours.

