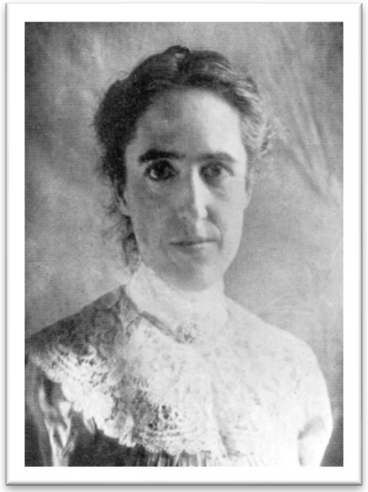
# HENRIETTA LEAVITT



**Henrietta Swan Leavitt (1868 - 1921)** was an American **astronomer**. Her health problems, which included a loss of hearing, didn't impede her intense dedication to astronomy, and **she discovered thousands of stars** as a "calculator" at Harvard University. From her observations she deduced a relation between the luminosity and the period of **variable Cepheid stars**, which is incredibly important to measure distances in the Universe. Her results, however, were used by her boss at the observatory, with only a minor mention in the paper of the role she played.

"There exists a simple relation between the luminosity of the variables and their period"

## The Astronomer who explained the Universe

The group of "calculators" at Harvard had routine assigned tasks to study photographic plates and to catalog stars. Nevertheless, many of these women obtained results of great importance for our current understanding of the Universe. In particular, Henrietta Leavitt – whose **law of variability of the variable Cepheids** allowed her to obtain their luminosities, which provided **the first method to measure extragalactic distances**, which demonstrated the enormity of the Universe! These results were subsequently used by Hubble to demonstrate that **the Universe is expanding**.

## More information

Variable Cepheids and Distance

Celebrating the Forgotten Astronomer

Period-Luminosity Relation

## Experiment: Make your own Homemade Telescope

The telescope is a fundamental instrument for work in astronomy and astrophysics which allows us to observe distant objects. In this exercise we propose that you construct your own telescope to observe the stars or the Moon.

## What you need

1. Two cardboard tubes, with the same diameter
2. Scotch tape or painter's tape, and a measuring tape (or ruler)
3. Two magnifying glasses of different sizes (without any frame or handle, just the lens; if you can't find the lens by itself, you can carefully remove the frame with the help of pliers)
4. A flashlight or a spotlight
5. Some scissors and black cardstock or construction paper

## Procedure

The bigger magnifying glass will be the principal lens, and the first thing to do is to calculate the focal distance of the lens. In a dark area, shine the flashlight on the cardstock from a relatively long distance away.

1. Place the magnifying glass lens in between the flashlight and the cardstock and move it until the light that hits the cardstock is as focused as possible (you can see how to do so in this video). The distance between the cardstock and the magnifying glass is the focal distance of the lens. Keep in mind the total length of the tubes (placed end-to-end) should be sufficient to cover the focal distance. If the length is shorter than the focal distance, you will need longer carboard tubes.

2. If there are endcaps on the tubes, take them off and cut one of the tubes lengthwise.

3. Reattach it with tape, leaving it with a diameter slightly larger than the other tube so that it can fit inside, like here.

4. At the end of one of the tubes, use the tape to attach the principal lens to the opening.

5. Then take the cardstock and make a hole the size of the smaller magnifying glass lens (this will be your ocular lens).

6. Attach the ocular lens to the cardstock and attach it to the end of the other tube of cardboard.

7. Place the thinner tube inside the wider tube and… voila! You have made your telescope! Don't forget – you should *never* use it to look at the sun because you can damage your eyes. With this telescope, you can only observe the moon, planets, and distant stars. You can also use it to take photographs of the night sky.

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