

# Variable stars

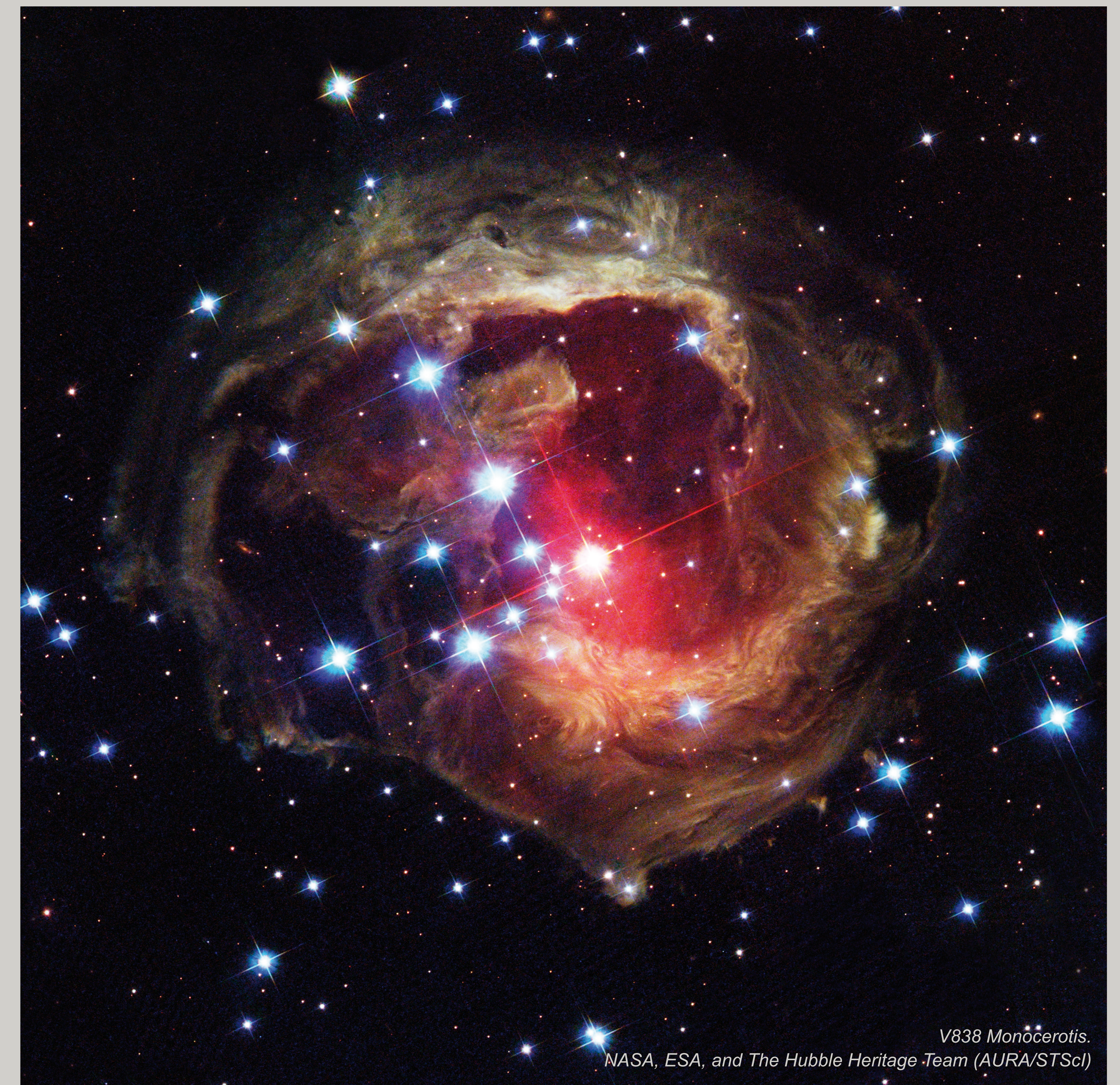
Part of the stars in the Universe are variables, that is, their brightness fluctuate with time. Studying them help us to understand the physical processes that happen in the interior of

Did you know that Gaia has already compiled precise photometric information for more than 500 000 stars, an unprecedented quantity?

## Different types of variability

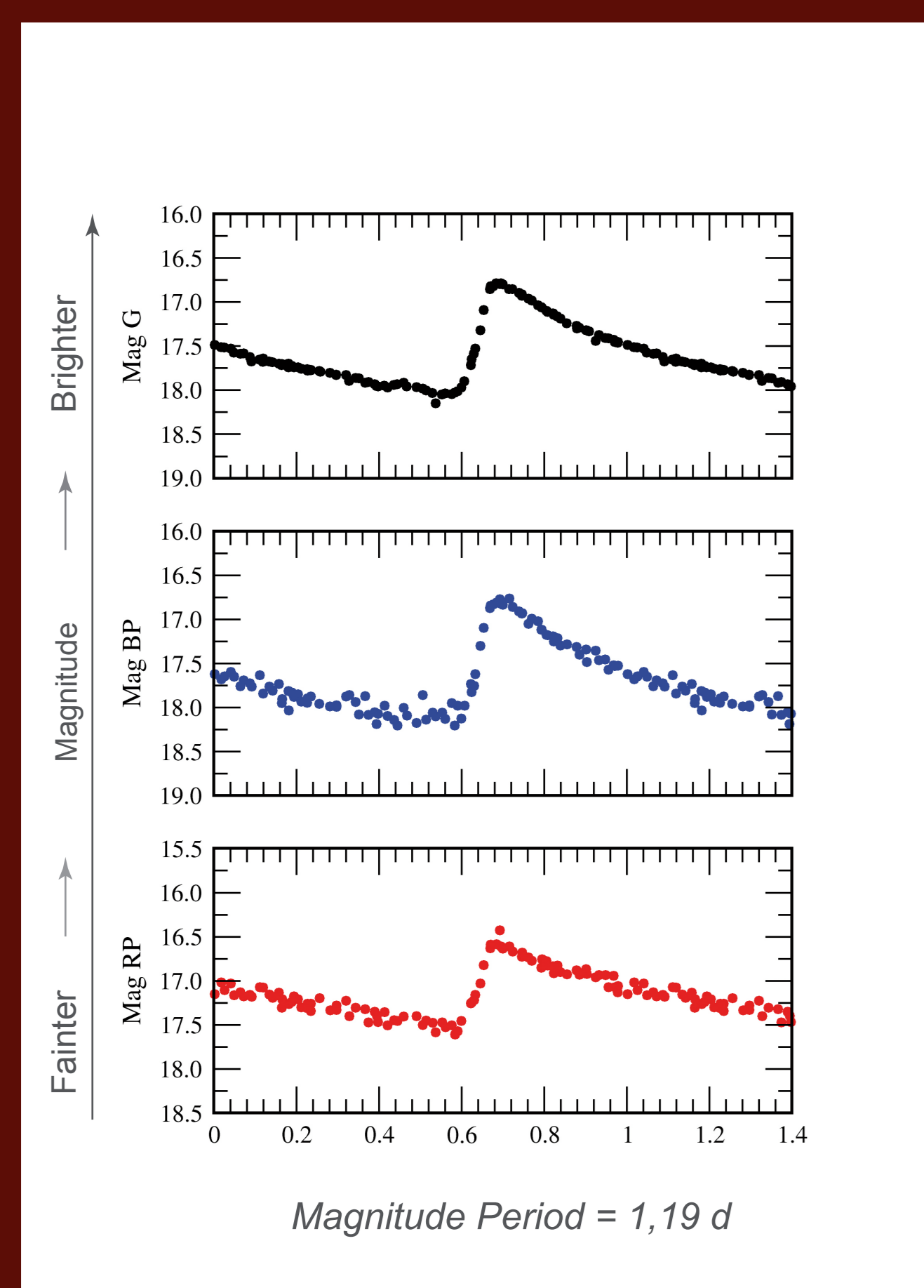
Intrinsically variable stars can be classified in pulsating variable stars and eruptive variable stars. In the first case, the star expands and shrinks periodically, causing a variation of its brightness. On the other hand, eruptive variable stars

show sudden and unpredictable brightness variations, possibly due to phenomena similar to those taking place in our Sun. The shape of the light curve (how the brightness varies with time) helps us to classify them.

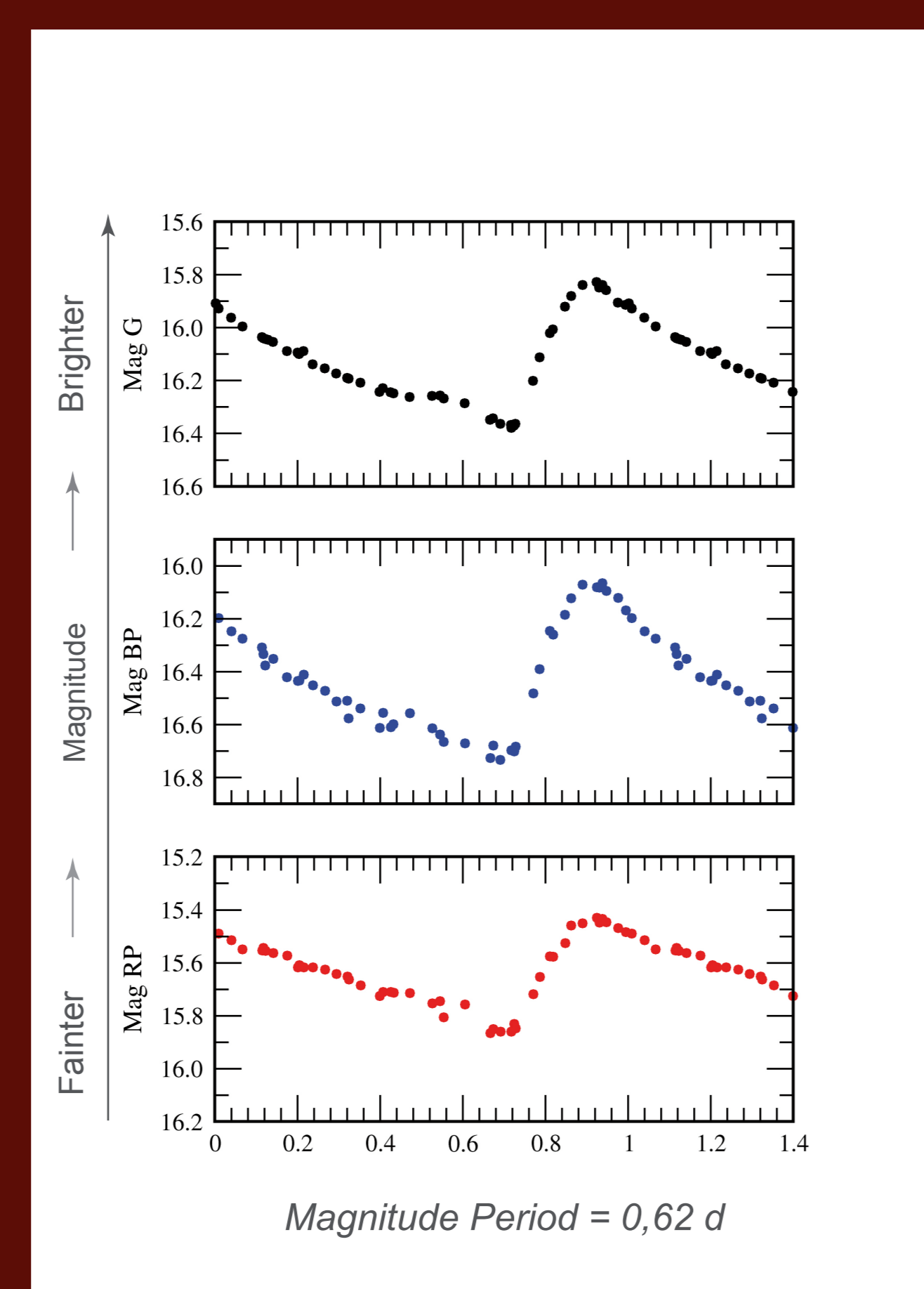


V838 Monocerotis.  
NASA, ESA, and The Hubble Heritage Team (AURA/STScI)

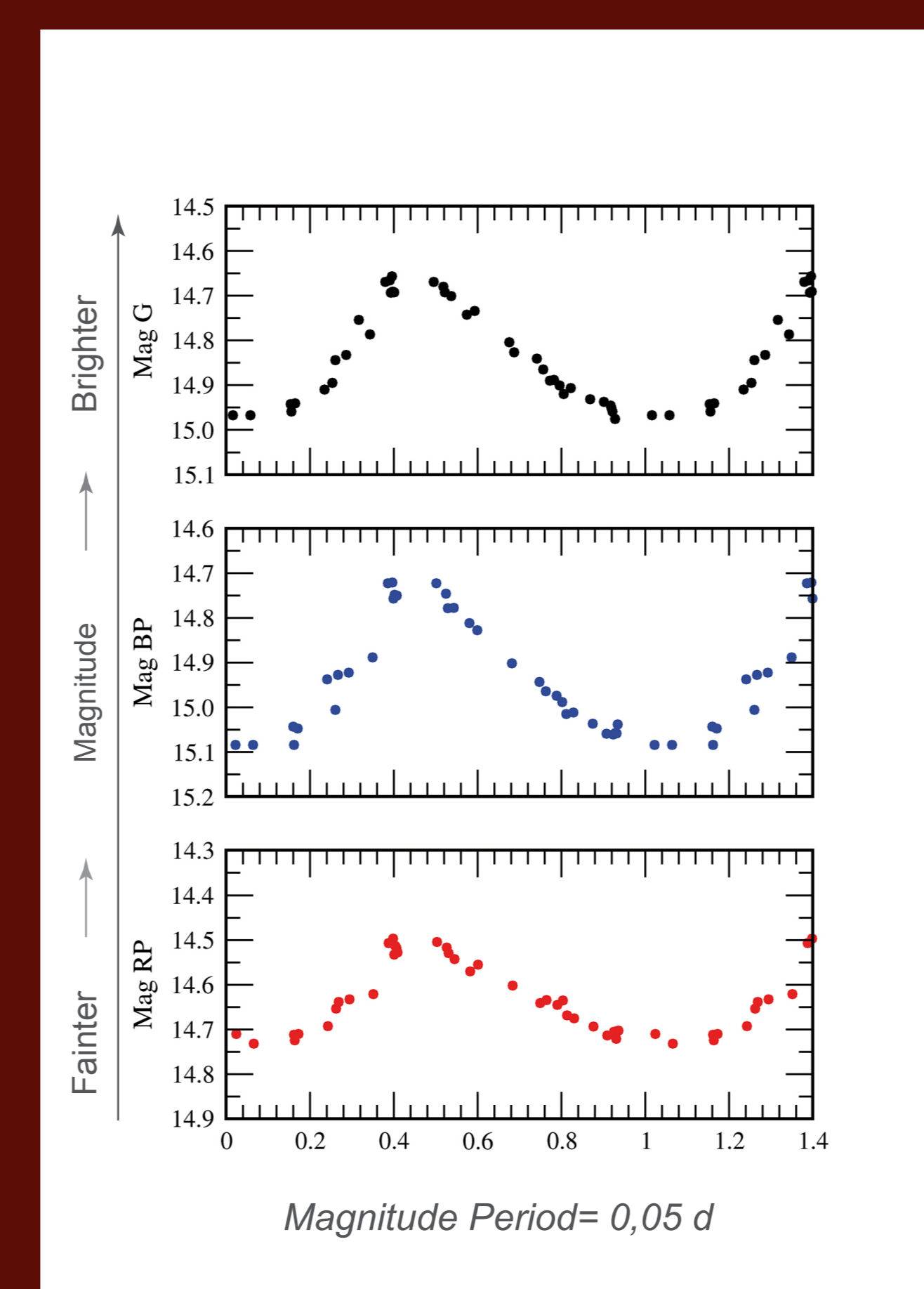
These three light curves obtained by Gaia correspond to three different types of pulsating variables. In the case of Cepheids and RR Lyrae, there is a relationship between the brightness and the variability period, and they are useful as distance indicators.



Cefeida



RR Lyrae



Delta Scuti

## Supernovae

Some stars finish their lives with a huge explosion that makes their brightness increase hundreds of thousands of times. Gaia discovers about 6 supernovae per day.

Supernova Gaia14aaa and its galaxy:

(M. Fraser/S. Hodgkin/ L. Wyrzykowski/H. Campbell/N. Blagorodnova/Z. Kostrzewa-Rutkowska/Liverpool Telescope/SDSS)

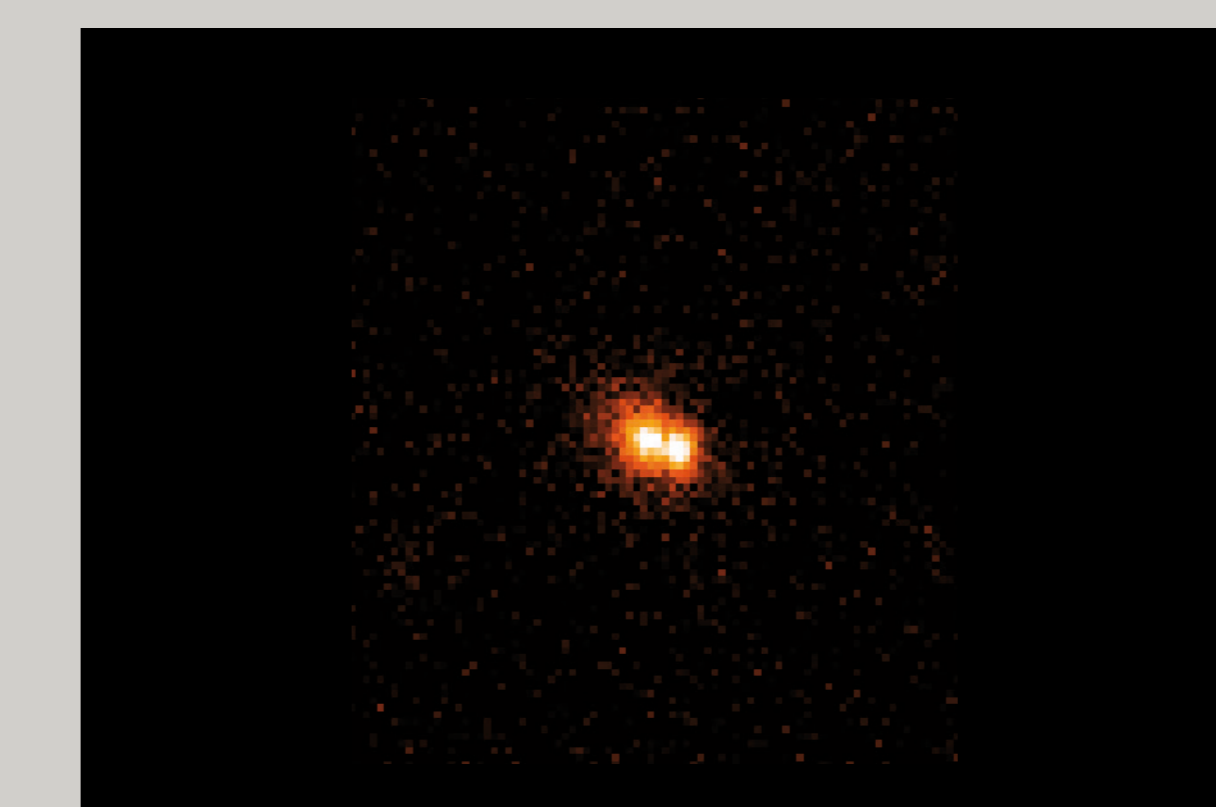


Image of the Supernova and its galaxy.

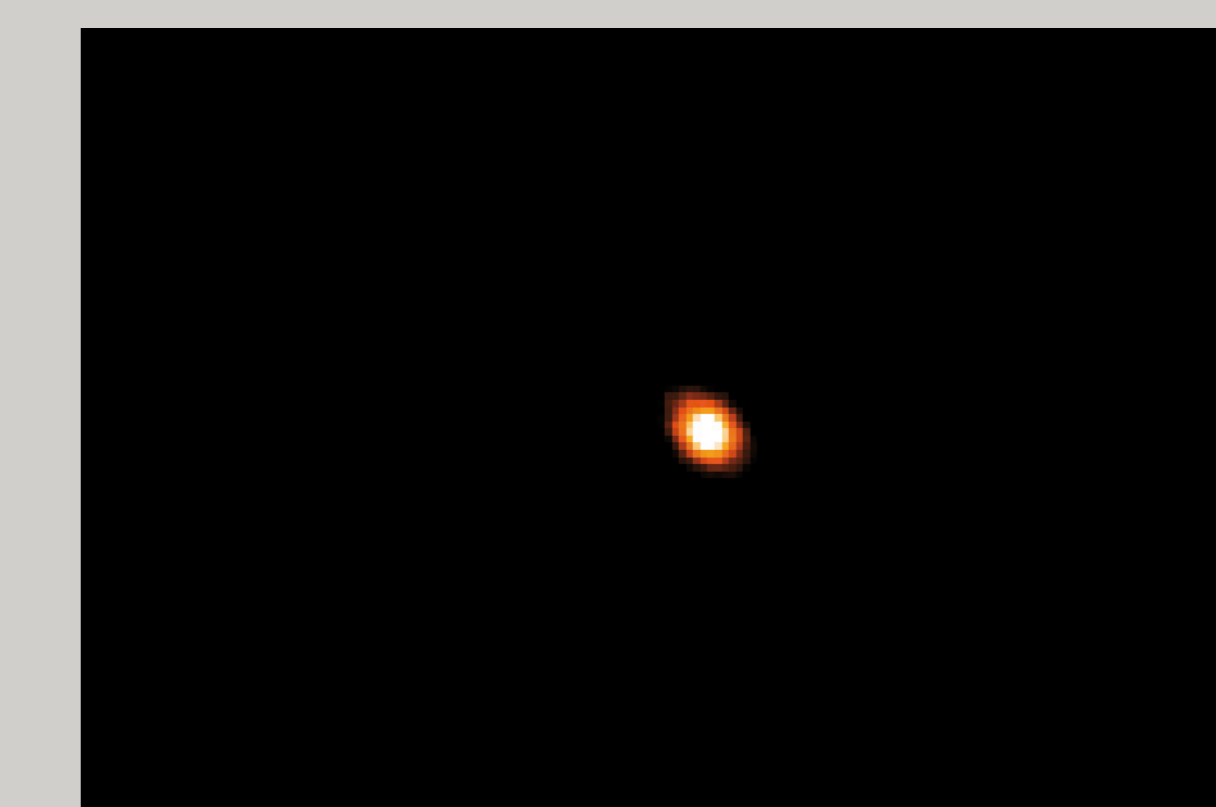
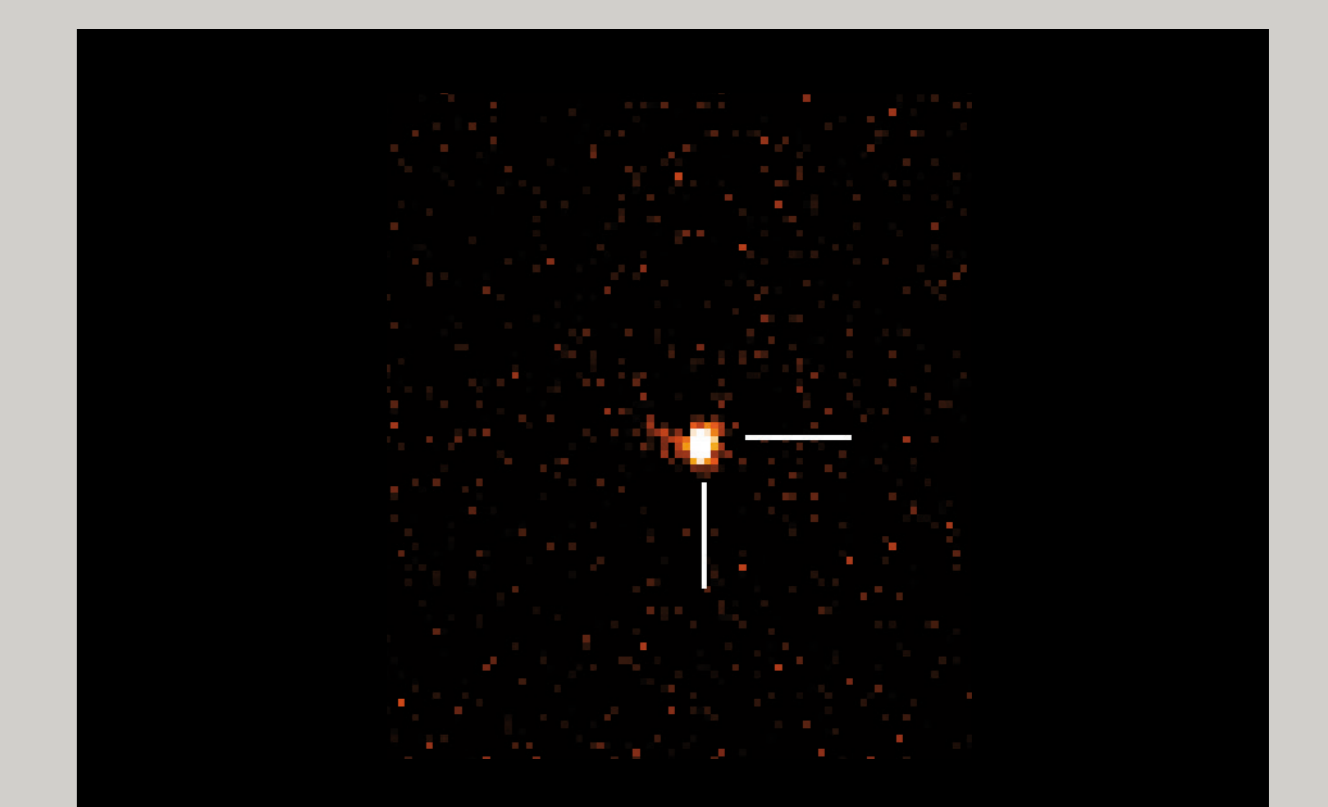


Image of the galaxy before the supernova explosion.



Difference of the two previous images where the supernova is visible.