



# The **Gaia** satellite at the **Royal Observatory of Belgium**



The European satellite Gaia will be launched in 2012. Gaia will provide very precise positions and distances of 1 billion stars and will take spectra of 150 million stars.

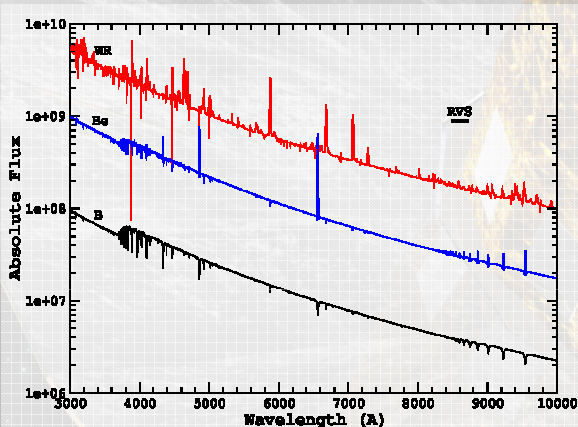
A large European consortium has been tasked with developing the necessary computer programmes to handle this enormous wealth of data. The Royal Observatory of Belgium is part of this consortium and collaborates in the development of this software in 4 specific areas.

## Classification of stars

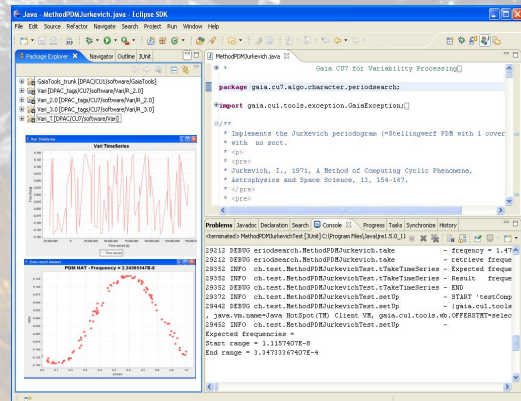
For each star, Gaia will measure how much light is emitted at different wavelengths.

Comparing this with theoretical models allows us to classify the star and to determine its surface temperature, luminosity, radius and mass.

The contribution of the Observatory consists in classifying massive stars and in calculating theoretical models for such stars.



## Variable stars

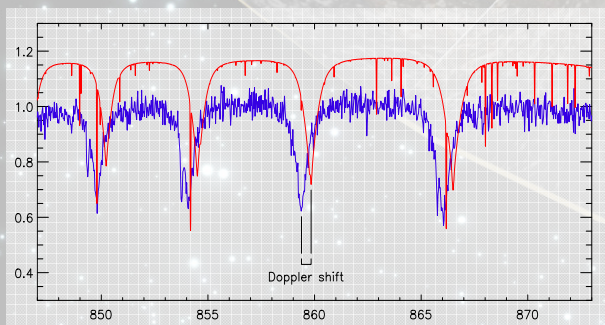


The stellar luminosity varies with time.

For many stars we can learn something about their structure and evolution from that variability.

The Observatory collaborates in characterizing the variability measured by Gaia. Software is being developed to discover, among other things, periodicities in the variability.

## Stellar velocities



Stars are moving with respect to us.

By using the Doppler effect, we can determine at what velocity a star is moving away from us, or is moving towards us. To do this we compare the observed spectrum of the star with a theoretical model. From the Doppler shift between the model and the observation we determine the velocity of the star.

The Observatory co-develops programmes that compare the theoretical models to the observed spectra in order to derive the stellar velocity.

## Minor planets

Gaia will also observe objects in our solar system. It is expected that Gaia will discover a number of special objects, such as minor planets with orbits entirely inside the earth orbit.

The positions measured by Gaia will be so extremely precise that they will not only substantially increase our understanding of the composition of the solar system, but they will also allow us to verify the theory of relativity.

The Observatory will provide software to determine the sky-coordinates of minor planets (right ascension and declination).

