

# The eyes of Gaia

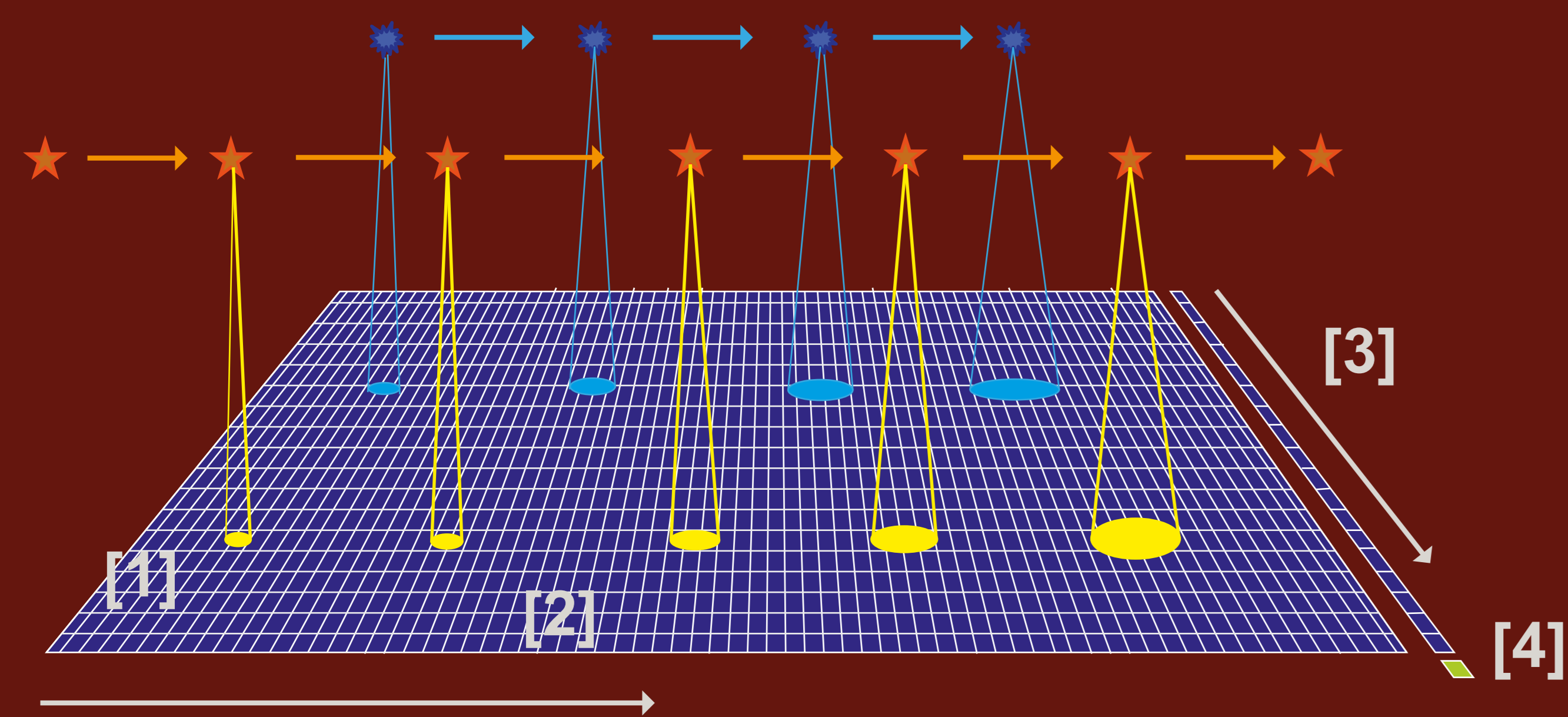
The solid state detectors register the images as digital cameras would do with a total of a thousand million pixels. It is the largest focal plane ever built to operate in space.

## How does a Gaia sensor work?

Unlike digital cameras, the sensors of Gaia capture light continuously and their charge is passed along to the next pixel synchronised with the movement of the stellar images over the focal plane.

[1] The pixels are light counters: The more light falls onto a pixel the more electrons are gathered.

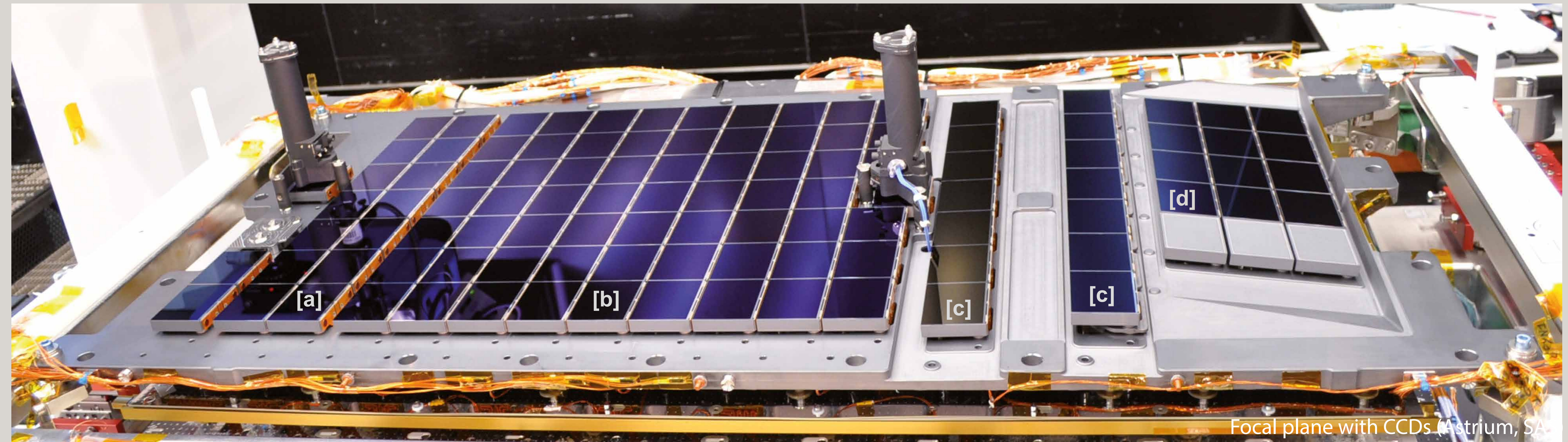
[2] The electrons move from one pixel to the next with the same speed with which the image of a star moves over the detector. This provides the optimum exposure time.



[3] On the right-hand side a read-out register (not exposed to light) moves the electrons in perpendicular direction.

[4] An output pixel transforms the cumulative number of electrons into a digital value which is stored in the satellite's memory for the later transmission to Earth.

106 solid state detectors of the focal plane detect the light of stars and galaxies.



[a] Sensors to detect stellar objects.

[b] Sensors to measure the position and brightness of these objects.

[c] Sensors to measure the colours of the stars

[d] Sensors for the spectrograph which splits the light into its different wavelengths.

## The mounting

Precise positioning of sensors by expert engineers.

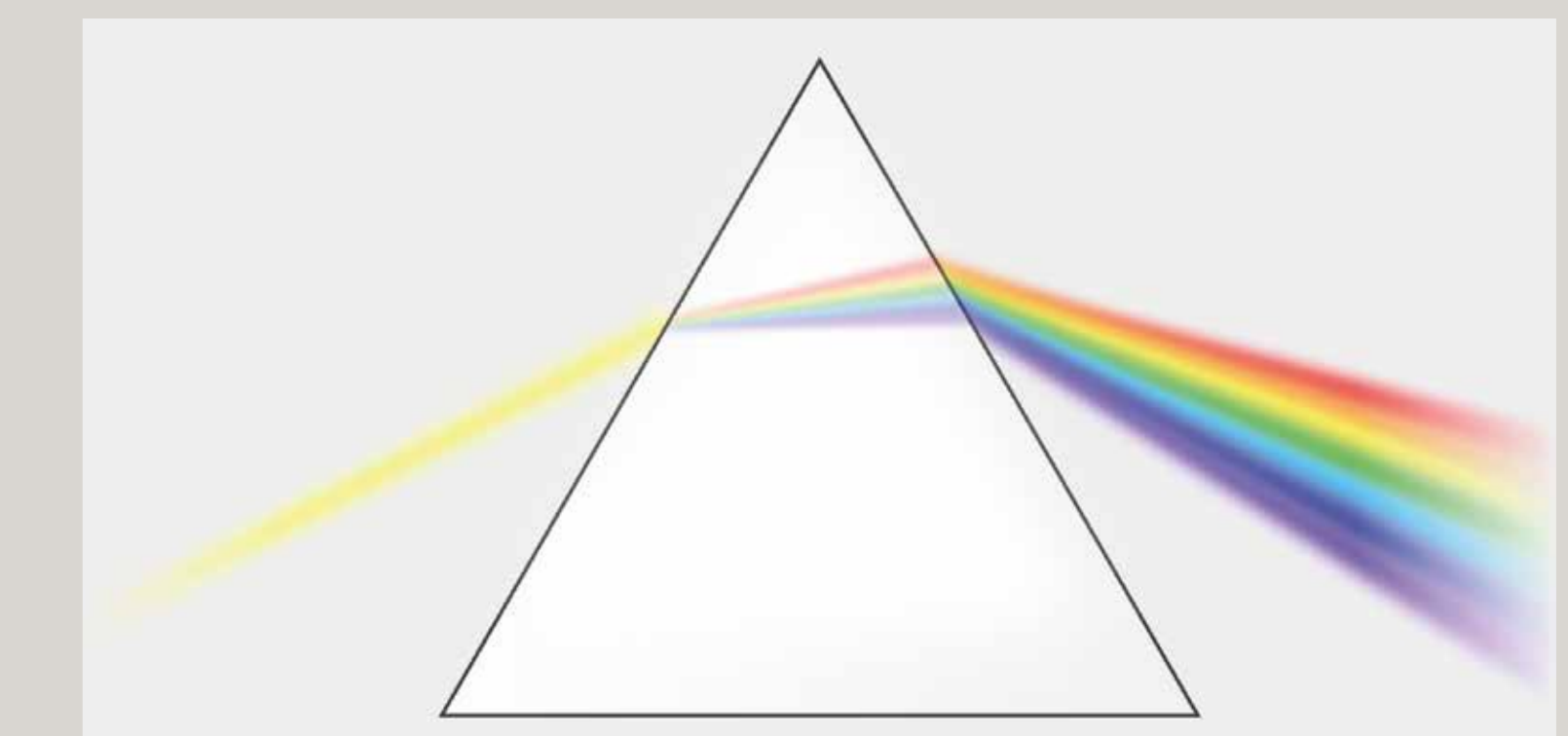


The whole focal plane is 104 cm wide and 42 cm high. The production took more than a year.

Do you know the temperature of the sensors? The sensors work at  $-110^{\circ}\text{C}$  and release the heat of 30 refrigerators!

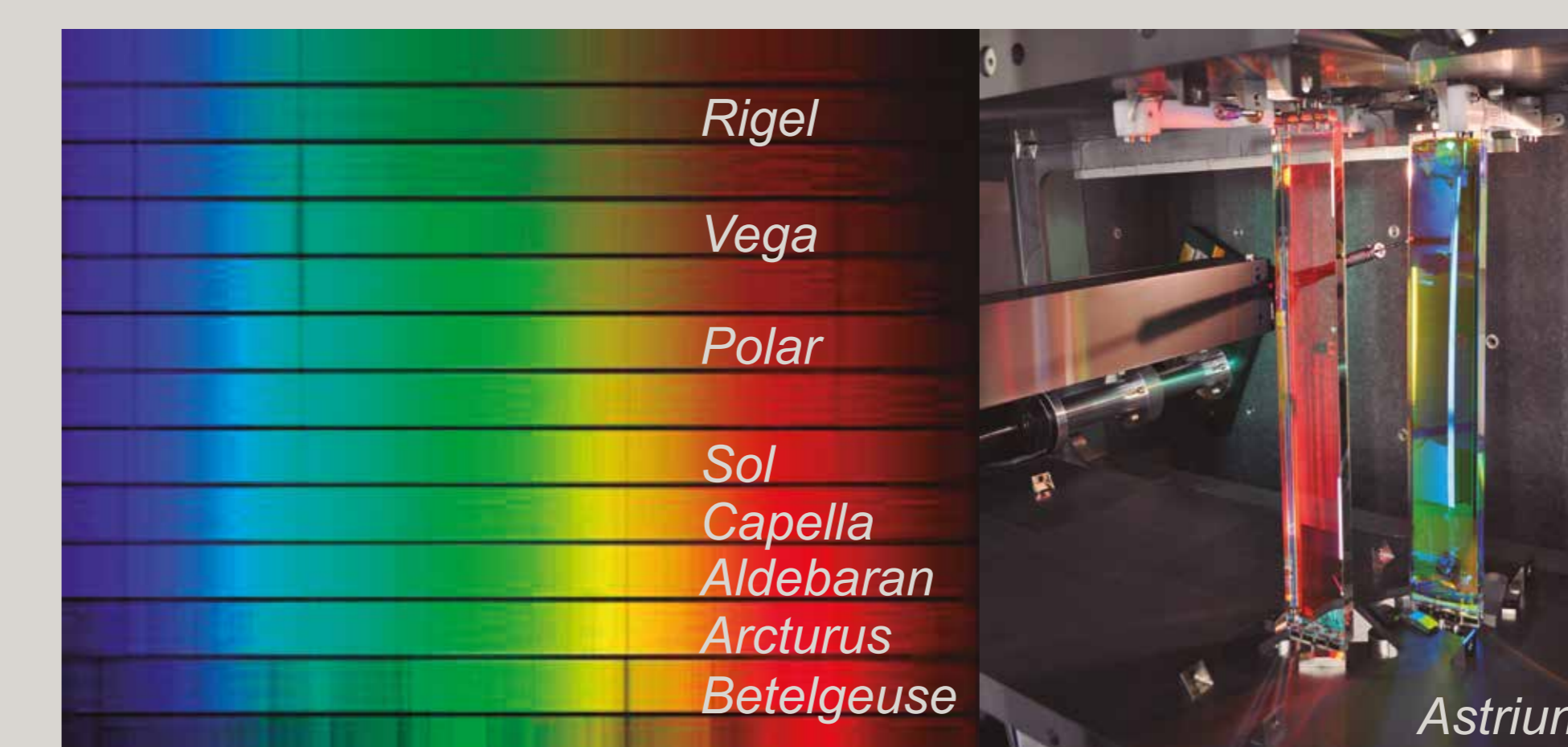
## The dispersion of light

When light goes through a prism it spreads into rainbow colours.

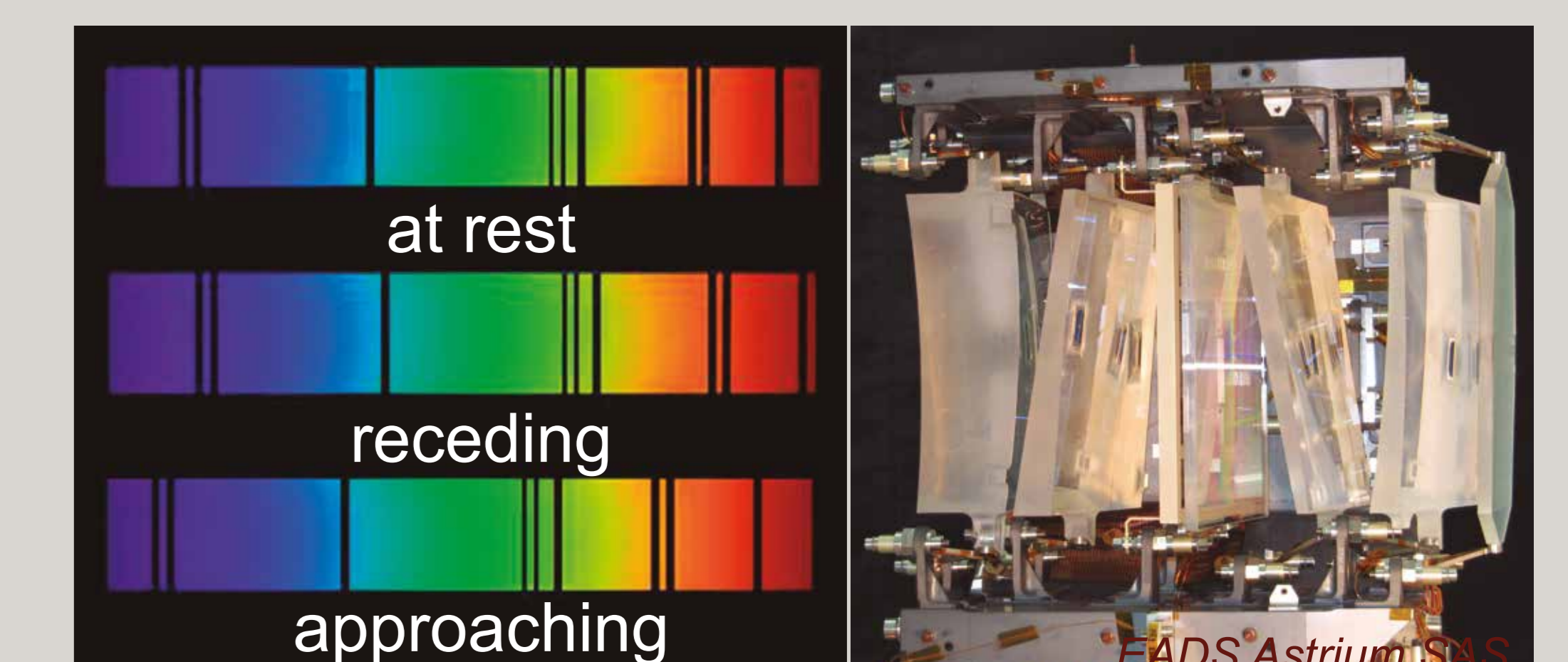


The intensity distribution in the spectrum and the dark lines (absorption lines) allow us to find out what kind of star or galaxy we are observing.

The position of the dark lines tells us about the radial velocity (the speed towards or away from the observer) of the star.



Prisms



Spectrograph