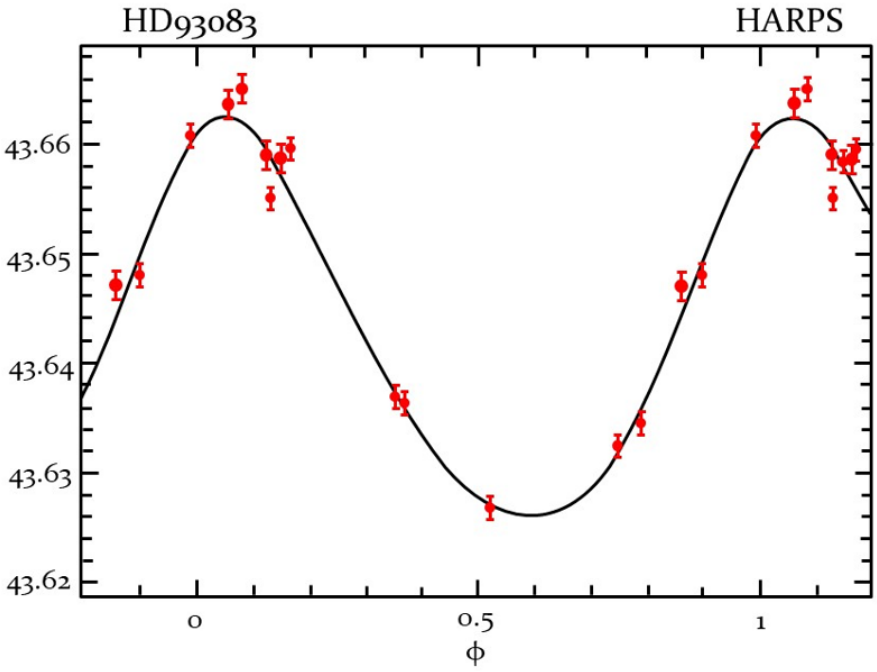
Q6-1

English (Official)

Macondo and Melquiades (12 points).

In 2019, as a part of the NameExoWorlds campaign of the International Astronomical Union, Colombia was granted an opportunity to select a name for the star HD 93083 and its planetary system. HD 93083 is a $K-type$ dwarf star and has one extrasolar planet orbiting it. Today they are officially known as Macondo (star) and Melquiades (planet), from the literary ideas of the Colombian writer Gabriel García Márquez.

This star has an effective temperature of 4995 K and an apparent visual magnitude of 8.3. As per GAIA DR2, the parallax for Macondo is 35.03 milliarcseconds. You may assume the orbit of Melquiades is perfectly circular. In the figure you can see the plot of radial velocity of Macondo with respect to the phase.



Radial velocity of Macondo (Y-axis in $km\ s^{-1}$) as a function of the phase (X-axis).

6.1	Find the wavelength $(in\,nm)$ of peak emission for Macondo in its rest frame (i.e., ignoring Doppler shifts).	2.0pt
6.2	Find the distance of this system from the Earth (in parsecs) and the absolute visual magnitude (M_V) of the star.	2.0pt
6.3	Calculate the mean radial velocity of Macondo (in $km\ s^{-1}$).	2.0pt

Q6-2

English (Official)

6.4	Calculate the orbital velocity (in km/s) of Melquiades (v_p), if mass of the star (m_s) is $0.7\ M_\odot$ and the mass of exoplanet (m_p) is $7 \times 10^{26} kg$. Assume that the orbital plane of the system is edge-on with respect to our line-of-sight.	2.0pt

6.5	Find the orbital radius of Melquiades (in au) and its orbital period (in days).	4.0pt