

Exercise sheet

September 3, 2017

Exercise 1 Use the picture of the parallax method (Figure 1) to derive the distance formula of parallaxes. The star IK Pegasi is a supernova candidate. It has a parallax of $0.022''$. Derive the distance of IK Pegasi.

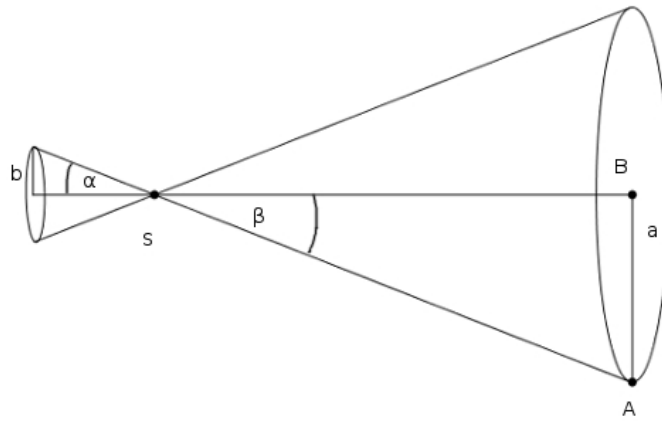


Figure 1: Scheme of the parallax method. S is the star whose parallax is requested, B is the position of our Sun, A is the position of the Earth, $a = 1 \text{ AU}$ and $\alpha = \beta$ is the parallax angle.

Exercise 2 The predicted light curve of IK Pegasi looks like that shown in Figure 2. Use the picture to measure the apparent magnitude of the peak and then derive the absolute magnitude with the distance modulus formula assuming a negligible absorption. Is the result consistent with the value usually accepted (-19.4)?

Exercise 3 Table 1 shows velocities and apparent magnitudes of some SNIa. Plot the date in a v-d diagram (assume a negligible absorption). Is there a relation between the velocity and the distance? What does it imply? Provide an estimate of the slope, i.e. of the Hubble constant.

PREDICTED LIGHT CURVE OF THE SN IA CANDIDATE IK Pegasi-b

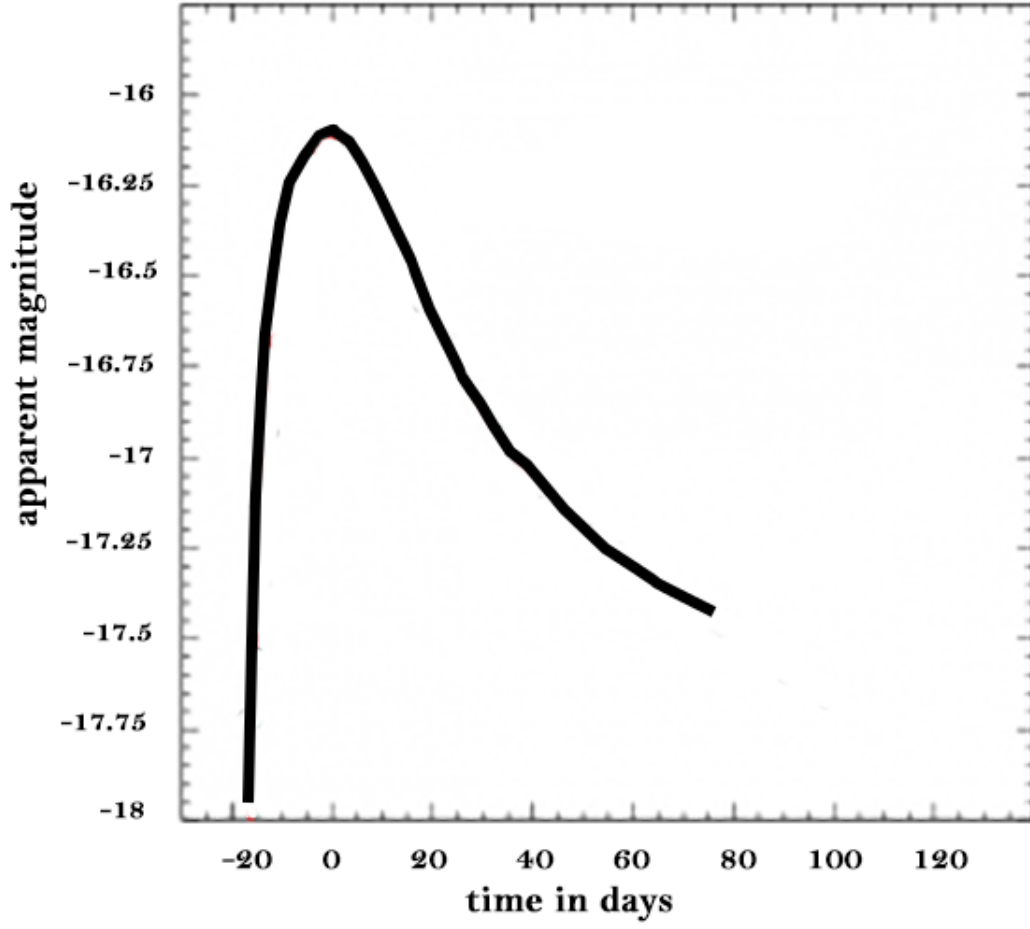


Figure 2

$V[km/s]$	m
3500	14.05
7000	15.58
10500	16.56
14000	17.10
17500	17.54
21000	18.05
24500	18.28
28000	18.64
31500	18.79

Table 1