UNIVERSITÀ
DEGLI STUDI
DI BRESCIA

Exercise on RAY TRACING assigned on January 23, 2023

1. By using Beam Four verify that the lensmaker's formula is correct: use a plano-convex lens, the glass has a refractive index equal to 1.45 and the focal length must have a value between 8 and 16 cm. In a plano-convex lens the surface on one side is spherical and convex (as in a bi-convex lens), but the surface on the other side is flat. At least two figures of the report must clearly show how the traced rays identify the focal position on both sides of the lens.

2. By using Beam Four verify that in the case of a compound lens made of 2 plano-convex lenses L_1 (having focal length f_1) and L_2 (having focal length f_2) the distance s_i between L_2 and the image is given by the following formula:

$$s_i = \frac{f_2 d - \frac{f_1 f_2 s_o}{s_o - f_1}}{d - f_2 - \frac{f_1 s_o}{s_o - f_1}}$$

where s_o is the separation between the object and the first lens L_1 and d is the separation between the two lenses. The glass refractive index is 1.45 and the two lenses must have different focal lengths (in any case, between 8 and 16 cm). The distance d must be chosen by the student and more than one value can be considered during the analysis. The report must include at least two figures showing the formation of an image and a brief description of the procedure to check the proposed formula.

The deadline for submitting the report (which must be a pdf file NO longer than 3 pages) and the Beam Four files (separate files for point 1 and 2) is February 13, 2023. Report and files must be sent to daniele.modotto@unibs.it and the email subject must be: solution exercise January 23.