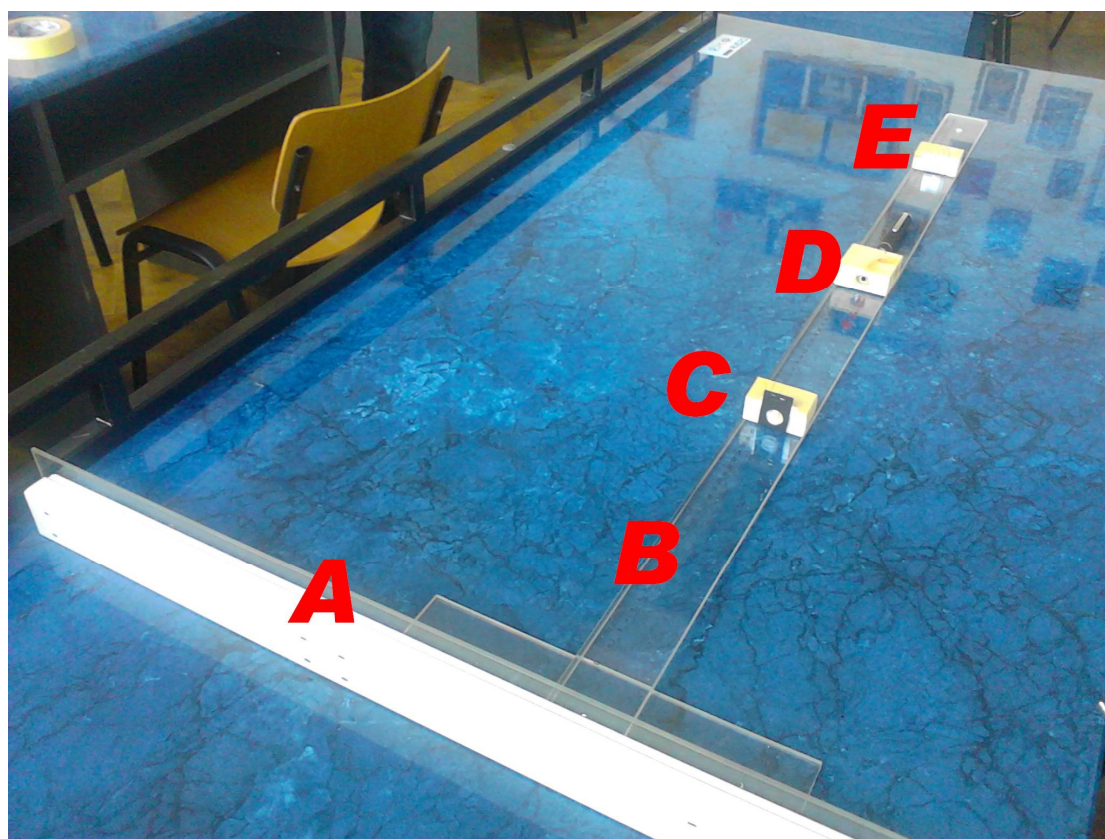


PROBLEM No. 2

The goals of this experimental task are:

- determining the constant of a diffraction grid
- determining the wavelength of a pointer laser with green light
- determining a specific characteristic of some "strange mirrors", made of a plastic sheet with a reflective layer, and producing multiple reflected beams for an incident beam

Experimental setup



On the bench you will find:

- a ruler-screen (A) for observing spots of light
- a T-shape ruler (B) serving as optical benchmark
- two laser pointers with red and green light respectively (the wavelength of the red light is 650 nm)
- a wooden piece (C) supporting the diffraction grid
- a wooden piece (D) in which to insert the laser pointer
- a wooden piece (E) supporting two "strange mirrors", labeled 1 and 2

CAUTION

Be careful not to look directly into the laser beam and not to point the pointer toward anyone! Do not touch the emitting end of the laser pointer, the diffraction grid or the "strange mirrors", as you might make them to malfunction.

You will have to observe positions of various spots on the ruler-screen and write down the observed values within a 1 mm precision. When you insert the laser pointer into piece D, the ON/OFF button will be automatically pressed and the pointer will light.

Task no. 1

Place the diffraction grid at $d_1 = 30$ cm and use red light.

- 1.a. Observe at least five spots on the ruler-screen and write down their positions.
- 1.b. Determine the constant of the diffraction grid and specify the magnitude of the measuring error.
- 1.c. Change the distance to $d_2 = 90$ cm and observe at least three spots on the ruler screen, writing down their positions.
- 1.d. Determine the constant of the diffraction grid using these values and specify the magnitude of the measuring error.

Task no. 2

Place the diffraction grid at $d_1 = 30$ cm and use green light.

- 2.a. Observe at least five spots on the ruler screen and write down their positions.
- 2.b. Determine the wavelength of the green light and specify the magnitude of the measuring error.
- 2.c. Change the distance to $d_2 = 90$ cm and observe at least three spots on the ruler screen, writing down their positions.
- 2.d. Determine the wavelength of the green light using these values and specify the magnitude of the measuring error.

Task no. 3

Place the green laser pointer so that light reaches the screen after reflecting on the "strange mirror" labeled 1.

- 3.a. Set up the system so that you can observe at least two spots and write down their positions. Do measurements for at least three distances mirror-screen in the range 25-40 cm.

3.b. Draw a diagram of your setup.

3.c. Using the data found determine the specific characteristic of "strange mirror" 1 that enables it to reflect one beam into multiple beams.

Place the green laser pointer so that light reaches the screen after reflecting on the "strange mirror" labeled 2.

3.d. Set up the system so that you can observe at least two spots. Do a measurement just as at point 3.a, for one distance in the range 25-40 cm.

3.e. Using the data found determine the specific characteristic of "strange mirror" 1 that enables it to reflect one beam into multiple beams.

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Contestant code

ANSWER SHEET FOR PROBLEM No. 2

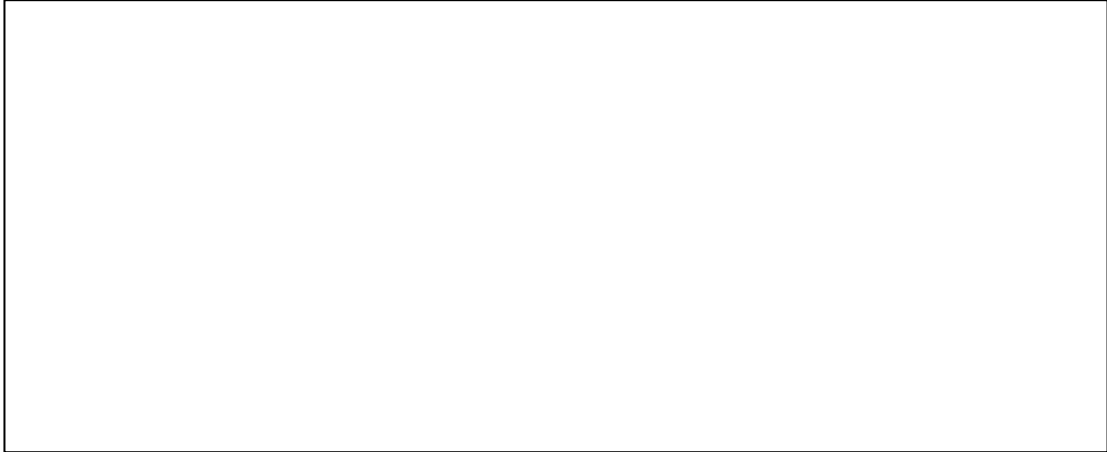
Task no. 1

a.1. Positions of at least five spots, for $d_1 = 30$ cm.

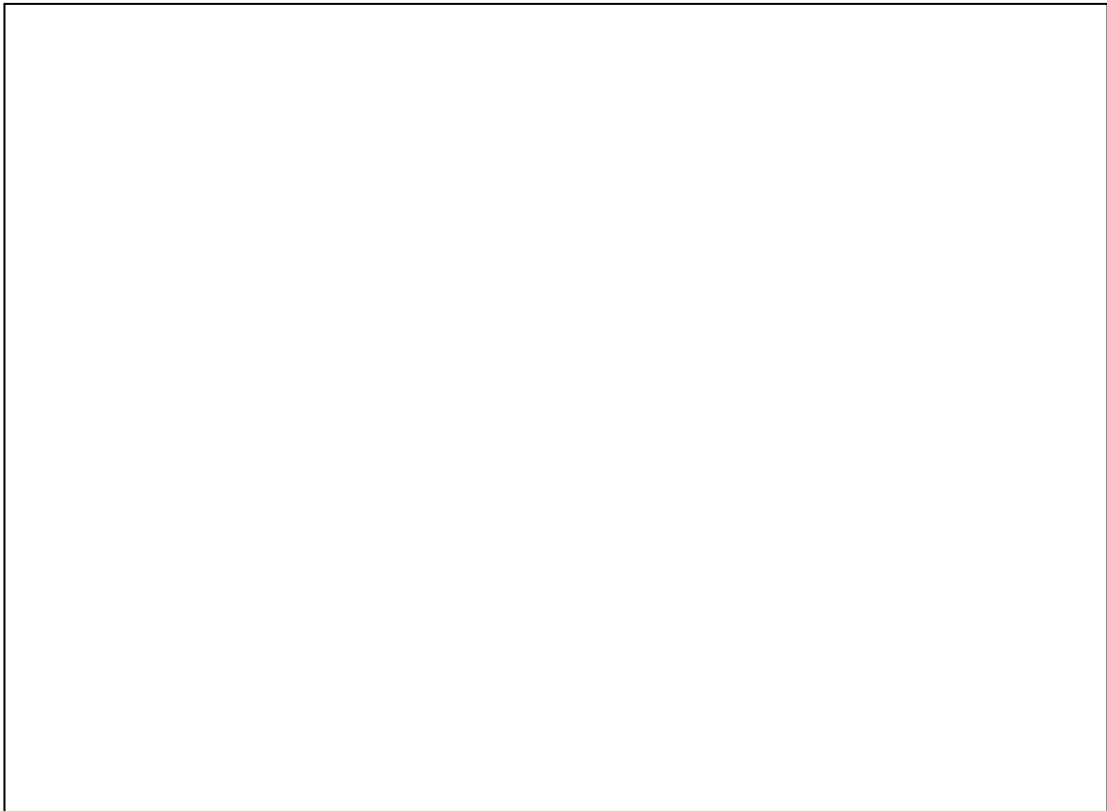
a.2. The value of the constant of the diffraction grid and the magnitude of the measurement error.

Contestant code

a.3. Positions of at least three spots, for $d_2 = 90$ cm.



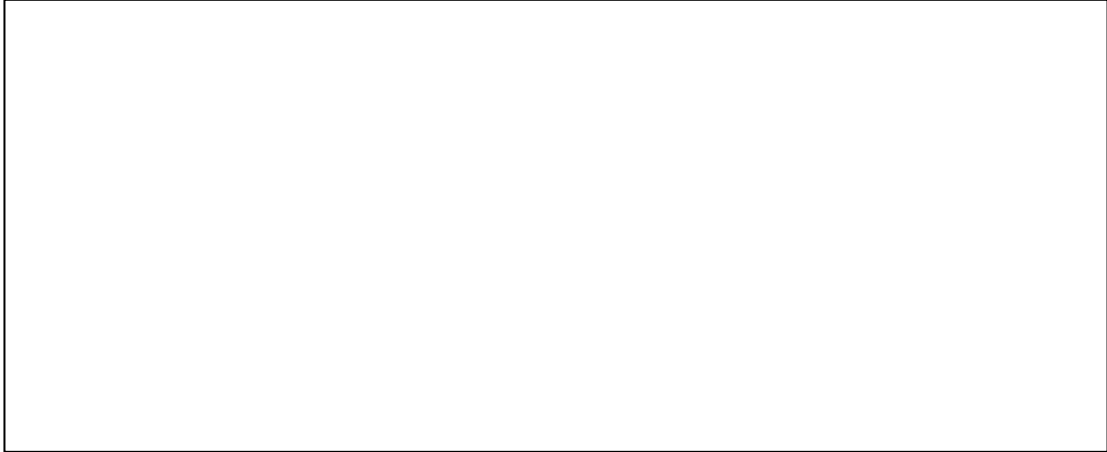
a.4. The value of the constant of the diffraction grid and the magnitude of the measurement error.



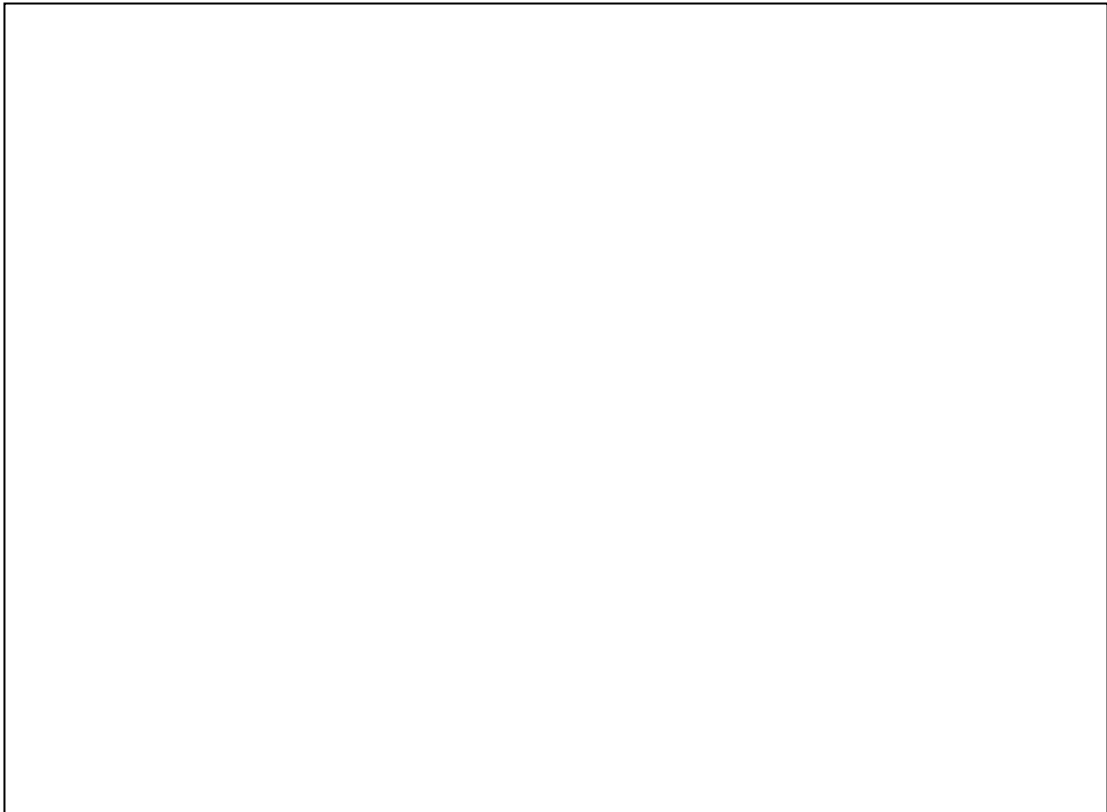
Contestant code

Task no.2

a.1. Positions of at least five spots, for $d_1 = 30$ cm.

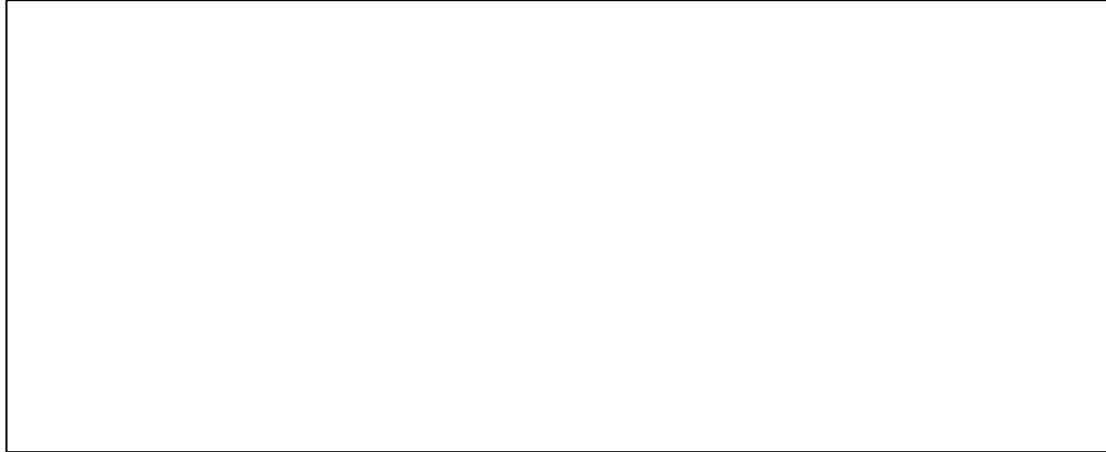


a.2. The value of the wavelength of the green radiation and the magnitude of the measurement error.

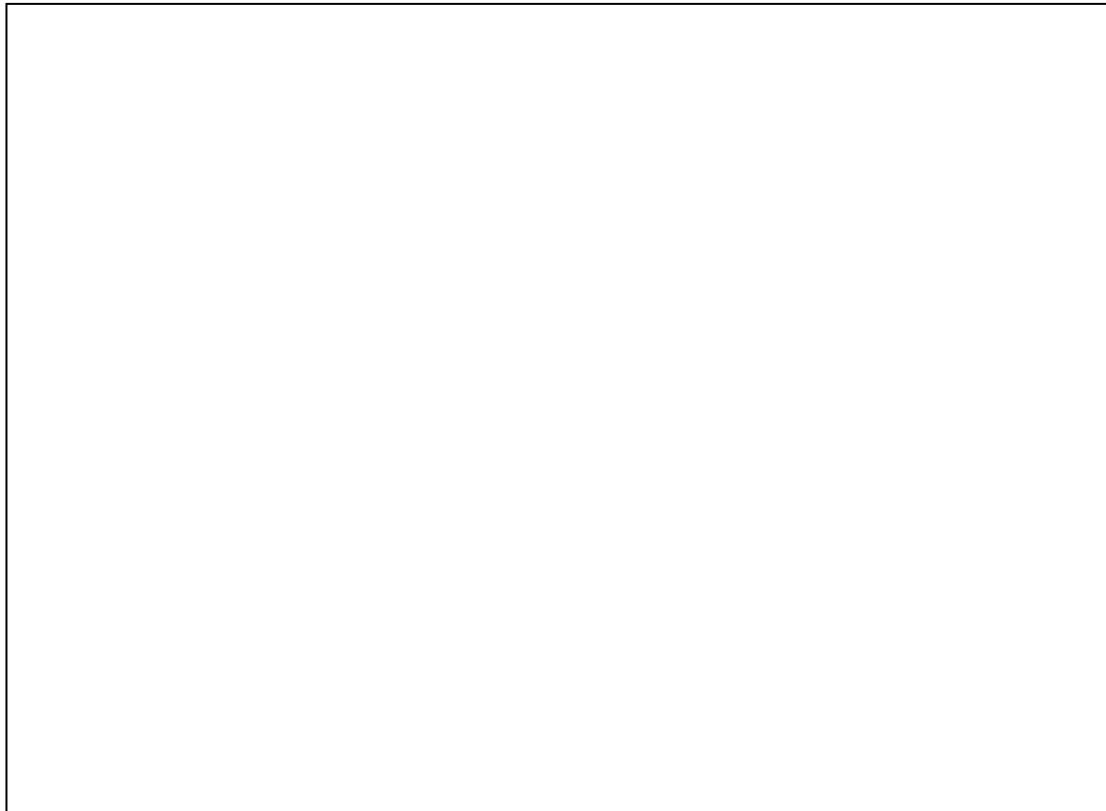


Contestant code

a.3. Positions of at least three spots, for $d_2 = 90$ cm.



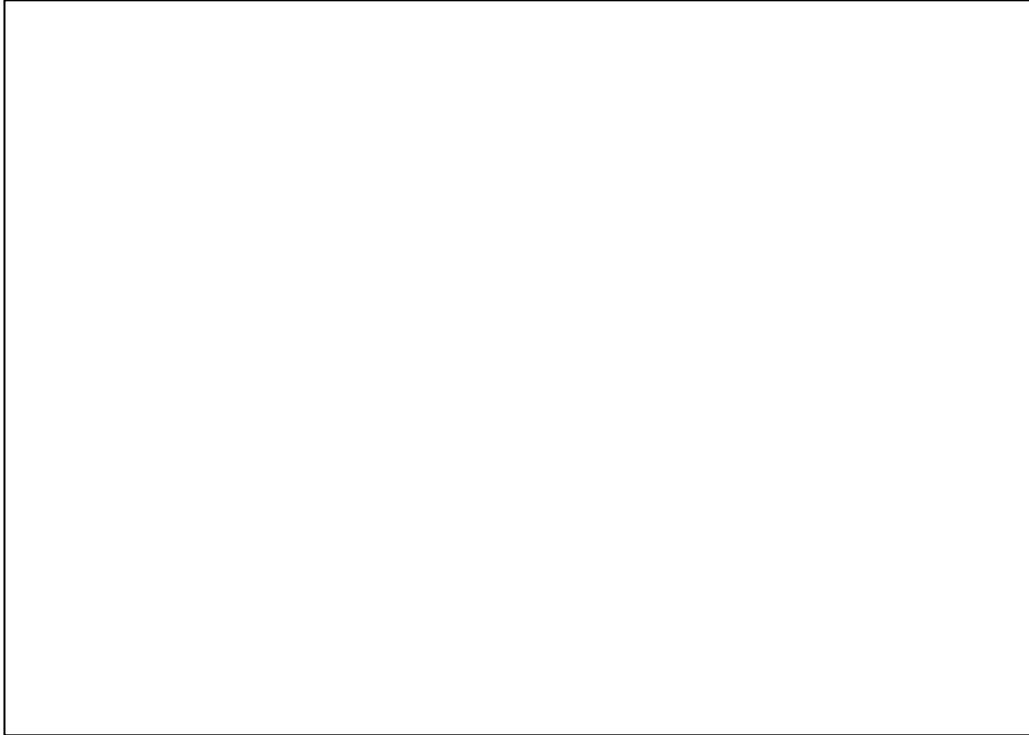
a.4. The value of the wavelength of the green radiation and the magnitude of the measurement error.



Contestant code

Task no. 3

3.a. Positions of at least two spots for at least three distances mirror-screen in the range 25-40 cm, for "strange mirror" 1.



3.b. Setup diagram

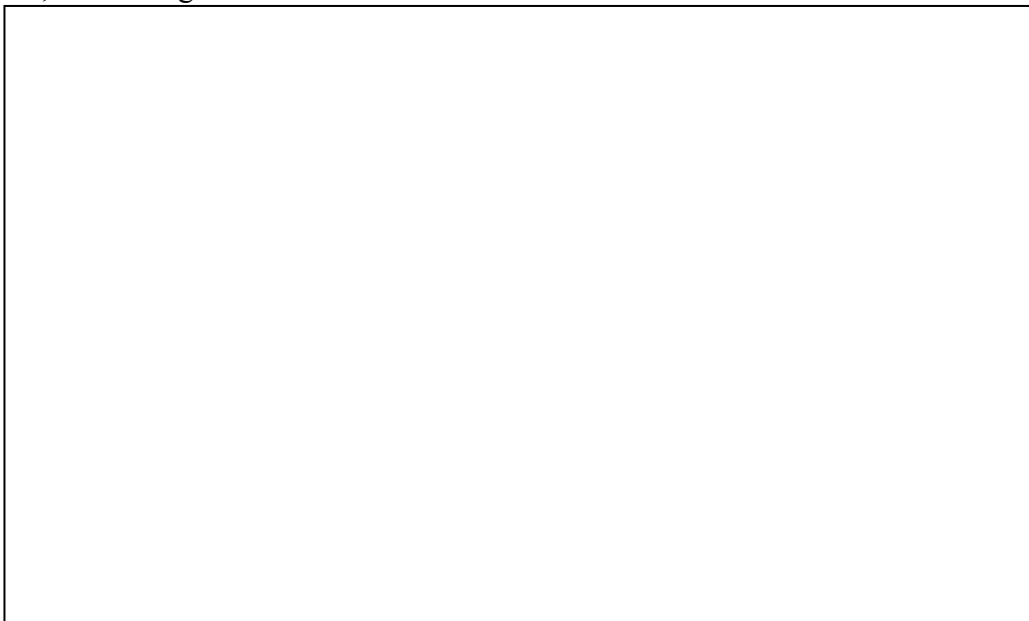


Contestant code

3.c. The specific characteristic of "strange mirror" 1, which enables it to reflect a beam into multiple beams.



3.d. Positions of at least two spots for one distance mirror-screen in the range 25-40 cm, for "strange mirror" 2.



Contestant code

3.e. The specific characteristic of "strange mirror" 1, which enables it to reflect a beam into multiple beams.

