

Laboratorijska vaja
FIZIKA
Spektri svetlobe

Vaja 17

Spektri svetlobe

Naloga:

- ✚ Izmeri valovne dolžine v zveznem spektru žarnice (projektor)
- ✚ Izmeri valovne dolžine črtastih sevalnih spektrov dveh plinskih cevi.
- ✚ Izmeri valovne dolžine spektrov dveh svetlečih diod..
- ✚ Natisni spektre
- ✚ Nariši absorpcijske spektre plinskih cevi.

Za izvedbo vaje si pomagaj z appleti na straneh:

- ✚ <http://www.dartmouth.edu/chemlab/info/resources/mashel/MASHEL.htm1>
- ✚ <http://www.teravation.com/products/spectroscopy/>.
- ✚ <http://www.harvard.edu/avalMiniSpectroscopy.html>

Meterstick Spectroscope

The figure to the right shows a schematic diagram of a meterstick spectroscope.

To use the spectroscope, drag the eye of the observer until it lines up with an emission line. Geometry labels and the diffraction equation will appear.

Move the observer to different lines to see how wavelength changes with angle. Notice how the spectrum on the meterstick changes with the viewing angle.

To examine the spectra of different elements, change the light source. To

Hydrogen Energy Levels

Stop Animation Light Source: helium

meterstick

slit

grating with line spacing, d

observer

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VALOVNE DOLŽINE V ZVEZNEM SPEKTRU ŽARNICE

	vijolična	modra	zelena	rumena	rdeča
l (m)	0,112	0,124	0,134	0,156	0,167
α [°]	14,93	16,45	17,7	20,38	21,68

$$l = 42,0 \text{ cm} \pm 0,1 \text{ cm}$$

$$d = 1/600 \text{ mm}$$

$$\lambda = \sin \alpha \cdot d$$

$$\lambda_{\text{vijolicna}} = 430 \text{ nm} \pm 5 \text{ nm}$$

$$\lambda_{\text{modra}} = 472 \text{ nm} \pm 5 \text{ nm}$$

$$\lambda_{\text{zelena}} = 507 \text{ nm} \pm 5 \text{ nm}$$

$$\lambda_{\text{rumena}} = 581 \text{ nm} \pm 5 \text{ nm}$$

$$\lambda_{\text{rdeca}} = 616 \text{ nm} \pm 5 \text{ nm}$$

HELIJ:

$$d = 1/300 \text{ mm}$$

MODRA

x[m]	3	4	5	6
l[m]	0,224	0,305	0,371	0,448
α [°]	7,63	7,47	7,68	7,63

$$d \cdot \sin \alpha = n \cdot \lambda$$

$$\lambda = d \cdot \sin \alpha$$

$$\alpha = 7,60^\circ \pm 0,09^\circ$$

$$\lambda = 440 \text{ nm} \pm 5 \text{ nm}$$

ZELENA

x[m]	3	4	5	6
l[m]	0,201	0,268	0,333	0,400
α [°]	8,48	8,48	8,53	8,53

$$\alpha = 8,51^\circ \pm 0,03^\circ$$

$$\lambda = 493 \text{ nm} \pm 2 \text{ nm}$$

RUMENA

x[m]	3	4	5	6
l[m]	0,169	0,227	0,285	0,339
α [°]	10,67	10,00	9,95	10,33

$$\alpha = 10,24^\circ \pm 0,33^\circ$$

$$\lambda = 582 \text{ nm} \pm 19 \text{ nm}$$

RDEČA

x[m]	3	4	5	6
l[m]	0,147	0,197	0,249	0,296
α [°]	11,53	11,48	11,35	11,47

$$\alpha = 11,46^\circ \pm 0,08^\circ$$

$$\lambda = 662 \text{ nm} \pm 5 \text{ nm}$$

NEON:

$$d = 1/300 \text{ mm}$$

MODRA

x[m]	5	6
l[m]	0,332	0,392
α [°]	8,57	8,70

$$\alpha = 8,64^\circ \pm 0,08^\circ$$

$$\lambda = 500 \text{ nm} \pm 5 \text{ nm}$$

ZELENA

x[m]	5	6
l[m]	0,306	0,370
α [°]	9,28	9,22

$$\alpha = 9,25^\circ \pm 0,04^\circ$$

$$\lambda = 536 \text{ nm} \pm 2 \text{ nm}$$

RUMENA

x[m]	5	6
l[m]	0,282	0,339
α [°]	10,03	10,05

$$\alpha = 10,04^\circ \pm 0,01^\circ$$

$$\lambda = 581 \text{ nm} \pm 1 \text{ nm}$$

RDEČA

x[m]	5	6
l[m]	0,307	0,257
α [°]	11,07	11,02

$$\alpha = 11,01^\circ \pm 0,04^\circ$$

$$\lambda = 638 \text{ nm} \pm 2 \text{ nm}$$

ORANŽNA

x[m]	5	6
l[m]	0,272	0,323
α [°]	10,42	10,52

$$\alpha = 10,47^\circ \pm 0,07^\circ$$

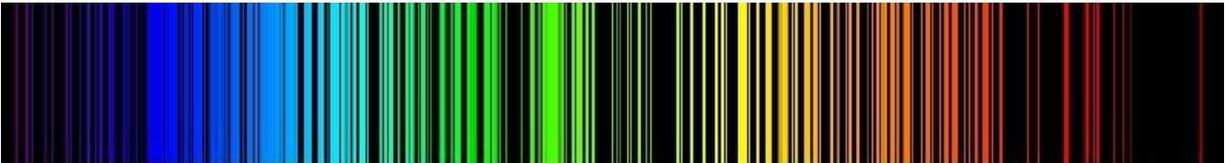
$$\lambda = 606 \text{ nm} \pm 4 \text{ nm}$$

SPEKTRI

HELIJ



NEON



ABSORBCIJSKI SPEKTRI PLONSKIH CEVI

HELIJ



NEON

