# vaja68

March 8, 2020

[67]:
```
import csv
from scipy.optimize import curve_fit
import math
import matplotlib.pyplot as plt
import numpy as np
import pandas as pd
```

### 0.0.1 Prvi del

$\lambda = 365\,nm$

[91]:
```
data = pd.read_csv('lambda_365nm.csv')

lightspeed = 299792458 # m/s

Uz = list(data['Uz']) # mV
I = list(data['I']) # A
```

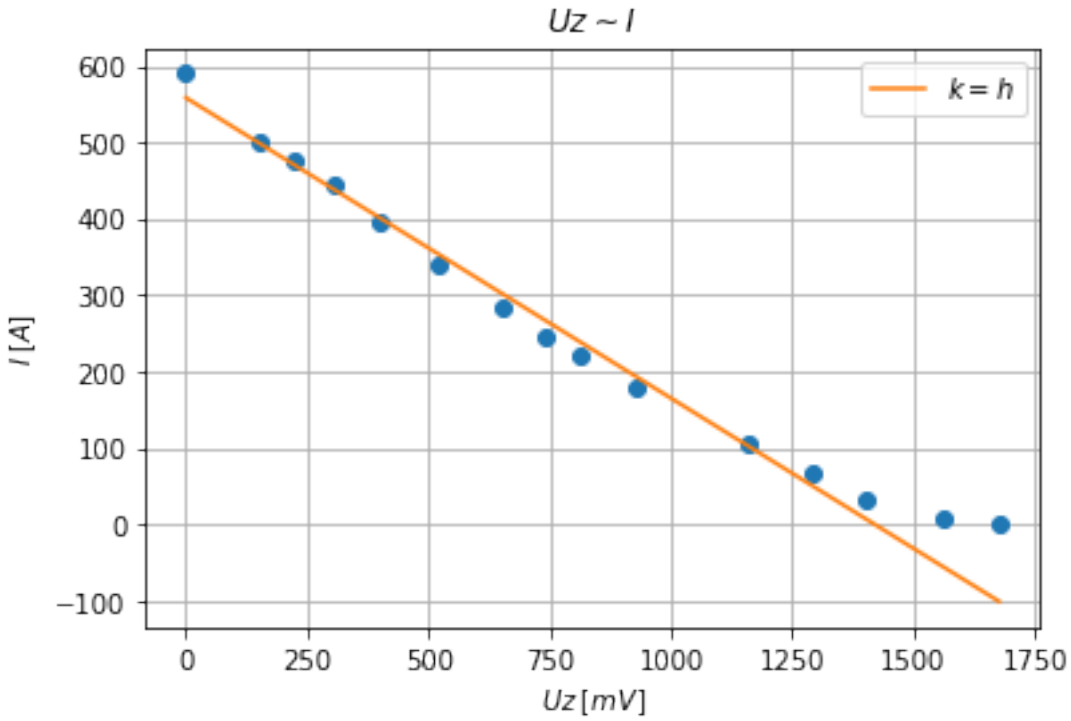
[92]:
```
def fit_func(x, a, b):
    return x*a+b

x = Uz
y = I
print(x,y)
```

```
[0, 154, 226, 305, 401, 523, 651, 743, 812, 927, 1158, 1291, 1405, 1560, 1677]
[590, 500, 475, 445, 395, 340, 285, 245, 220, 181, 107, 66, 34, 8, 0]
```

[70]:
```
params = curve_fit(
    fit_func, x[:-2], y[:-2])
a = params[0][0]
b = params[0][1]

# CALCULATE ERRORS FROM MATRIX
errs = np.sqrt(np.diag(params[1]))
print('naklon grafa: a =', a,'+-',errs[0], '\nb =', b,'+-',errs[1])
```

```
naklon grafa: a = -0.3927455546631995 +- 0.011676096454002227
b = 558.3877529134271 +- 9.204221433180102
```

[71]:
```
x_fit = np.linspace(x[0], x[-1], 100)

y_fit = fit_func(x_fit, a, b)

plt.plot(x, y, 'o')
plt.plot(x_fit, y_fit, label=r'$k = h$')

plt.title(r'$Uz \sim I$')
plt.xlabel(r'$Uz \: [mV]$')
plt.ylabel(r'$I \: [A]$')

plt.grid(True)

plt.legend()
plt.show()
```



### 0.1 Za vse

[103]:
```
data = pd.read_csv('izstopneU.csv').sort_values(by='U')

lambdas = list(data['lambda']) # nm
Um = list(data['U']) # mV
```

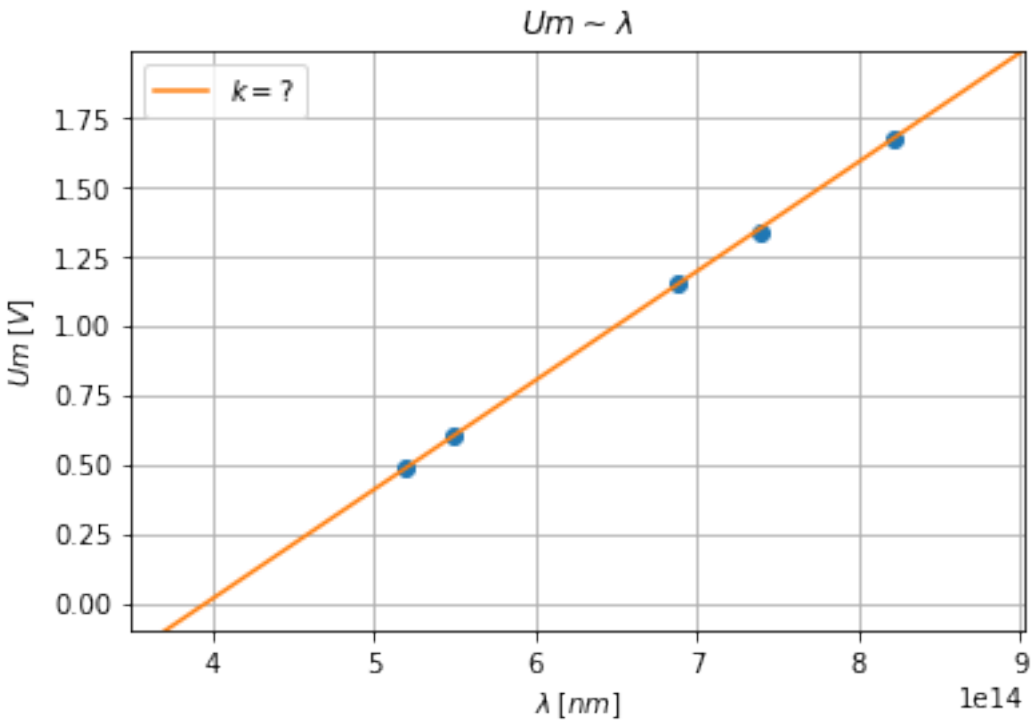
[130]:
```
x = [lightspeed/(mu*10**-9) for mu in lambdas]
y = [x/1000 for x in Um]
print(x,y)
```

```
[519570984402079.7, 549070435897435.9, 687597380733944.9, 740228291358024.6,
821349200000000.0] [0.484, 0.601, 1.154, 1.339, 1.677]
```

[132]:
```
params = curve_fit(
    fit_func, x, y)
a = params[0][0]
b = params[0][1]

# CALCULATE ERRORS FROM MATRIX
errs = np.sqrt(np.diag(params[1]))
print('naklon grafa: a =', a,'+-',errs[0], '\nb =', b,'+-',errs[1])
```

```
naklon grafa: a = 3.93432870439008e-15 +- 3.8145667846944667e-17
b = -1.559675975009778 +- 0.025684104153770218
```

[136]:
```
x_fit = np.linspace(0, x[-1]+x[-1]*0.1)

y_fit = fit_func(x_fit, a, b)

plt.plot(x, y, 'o')
plt.plot(x_fit, y_fit, label=r'$k = ?$')

plt.title(r'$Um \sim \lambda$')
plt.ylabel(r'$Um \: [V]$')
plt.xlabel(r'$\lambda \: [nm]$')

plt.ylim([-0.1,max(y_fit)])
plt.xlim([3.5*10**14,max(x_fit)])


plt.grid(True)

plt.legend()
plt.show()
```


Um ~ λ
k = ?
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
Um [V]
4
5
6
7
8
9
λ [nm]
1e14