**PLANCKS’S CONSTANT (BLUE LED)**

WORKSHEET

**GOALS**

* To calculate Planck’s constant (h=6,66∙10-34J/s)

**DISTANT ACTIVITY**

* Connect with the site: http:// e-science.web.auth.gr/circuits
* Click on the tab “Experiment” and connect with your own username and password (if you do not have you can sign in)
* Choose experiment 1 (Blue LED)
* Choose voltage from 0 to 3 Volts and fill in the matrix I

Matrix I

|  |  |  |
| --- | --- | --- |
| # | Voltage(Volt) | Electric current(mA) |
| 1 | 0.1 | I1= |
| 2 | 0.2 | I2= |
| 3 | 0.3 | I3= |
| 4 | 0.4 | I4= |
| 5 | 0.5 | I5= |
| 6 | 0.6 | I6= |
| 7 | 0.7 | I7= |
| 8 | 0.8 | I8= |
| 9 | 0.9 | I9= |
| 10 | 1 | I10= |
| 11 | 1.1 | I11= |
| 12 | 1.2 | I12= |
| 13 | 1.3 | I13= |
| 14 | 1.4 | I14= |
| 15 | 1.5 | I15= |
| 16 | 1.6 | I16= |
| 17 | 1.7 | I17= |
| 18 | 1.8 | I18= |
| 19 | 1.9 | I19= |
| 20 | 2 | I20= |
| 21 | 2.1 | I21= |
| 22 | 2.2 | I22= |
| 23 | 2.3 | I23= |
| 24 | 2.4 | I24= |
| 25 | 2.5 | I25= |
| 26 | 2.6 | I26= |
| 27 | 2.7 | I27= |
| 28 | 2.8 | I28= |
| 29 | 2.9 | I29= |
| 30 | 3 | I30= |
|  |

**DATA ANALYSIS**

* Wright down the Voltage for which the LED starts to radiate (while in the same time the ammeter shows an amount of current) (Threshold Voltage)

Vthr = ……………… .

* Calculate photons energy which are radiated from blue LED

The wavelength of blue color is about 480nm = 480∙10-9m, which means that the energy of radiation can be calculated by the formula:

 Εph =h∙f = $\frac{h∙c}{λ}$ (1) where c=3∙108m/s

* Calculation of Planck’s constant

Photons energy (Eph) derives from the applied voltage (V) by the formula:

 $ E\_{ph}=e∙V (2)$ where e=1,6∙10-19C

From equations (1) and (2) we conclude that

$$\frac{h∙c}{λ} =e∙V\_{thr}$$

 and hence the calculation of Planck’s constant is possible.

**THINK:**

After the experiment I conducted, Planck’s constant appear to be: h=……………………… .

By using the formula $\frac{h\_{the}-h\_{exp}}{h\_{the}}$ ∙100% I can calculate the % difference from the theoretical value which is ……………………… .

This difference may be a result of:

α. .........................................................................................................

**Help us to improve ourselves!**

**Answer to the questionnaire!**

β. ........................................................................................................

γ. ........................................................................................................