**Diffraction & Interference**

**Part 1: Single slit diffraction**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Slit label | Slit width **d**(mm) | Width of central max **W**(mm) | Calculated Wave length **λ**(nm) | **%** **uncert** | wave length with **absolute uncertainty** (Sig figs must be correct. See how to do below\*)**λ ± δλ**(nm) |
| A  |  |  |  | +/- 25 |  |
| B  |  |  |  | +/- 12.5 |  |
| C  |  |  |  | +/- 6.25 |  |
| D  |  |  |  | +/- 3.13 |  |

Distance to the screen D = 4000 mm

Wave length λ is given by $λ=\frac{W}{2D} d$

**Part 2: Double slit interference**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Slit label | Slit spacing **d**(mm) | Number of tick marks used**(n-1)** | **2y (measured distance)**(mm) | **yaverage**(mm) | Calculated Wave length **λ**(nm) | **%****uncert** | Calculated Wave length **λ ± δλ**(nm)Sig figs must be correct |
| A  |  |  |  |  |  | 2 |  |
| B  |  |  |  |  |  | 1 |  |
| C  |  |  |  |  |  | 2 |  |
| D  |  |  |  |  |  | 1 |  |

Distance to the screen D = 4000 mm.

Wave length λ is given by, $λ=\frac{d\_{slit spacing}}{D} \left(\frac{2y}{n-1}\right)$ $λ=\frac{d\_{slit spacing}}{D} y\_{average}$

\***How to do uncertainty** (i.e., fill in last columns of data tables above). Say you calculated a wavelength of 616.9 nm with an uncertainty of 12.5% or **616.9nm +/- 12.5 %.**

Writing in absolute uncertainty gives you a 616.9 +/- 77,1 nm. Written with correct sig figs we have **620 +/- 80** nm. Note that uncertainty is one sig fig. *It is ok to have two fig figs for uncertainty* ***when the uncertainty starts with a one*** *(e.g., as +/- 144 nm, which would be written as +/- 140 nm)*