

## Lecture 2 - Practical exercise:

1.) Use a green laser pointer with a known wavelength (532nm) to determine mesh size of electron microscopy grids (300 and 400 mesh). The “mesh” indicates the number of grid squares per one inch (2.41cm). Use reflections [1;0] and [5;0] for the measurements and calculations. Use your calculated value of the mesh size to calculate the wavelength of a red laser pointer.

## Tasks

1. Draw a 2D lattice with  $a=b$ ;  $\alpha=90^\circ$ . Draw the following lattice planes in the lattice:
  - (a) [0;1], [1;0], [0;-1], [-1;0], [1;1], [-1;-1], [1;-1], [-1;1]
  - (b) [2;1], [3;2], [-1;2]
2. At what phase angle will an electromagnetic wave have 65% of the maximum possible electric field strength? (Use Angard diagram.)
3. Calculate how many periods of the electromagnetic wave will pass through a given point in vacuum in one second for:
  - (a) visible light ( $\lambda=500\text{nm}$ )
  - (b) x-ray radiation ( $\lambda=1\text{\AA}$ )
4. What will be the amplitude and the phase (relative to wave A) of a wave resulting from the addition of two waves A and B with identical amplitudes and wavelengths. In case the wave B is shifted:
  - (a)  $+45^\circ$  relative to A
  - (b)  $-20^\circ$  relative to A