

Lecture 2 – Homework

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° relative to A
5. Draw a macroscopic image of a crystal built out of cubic unit cells that has visible only the lattice planes:
 - (a) $[1;0;0]$, $[0;1;0]$, $[0;0;1]$, $[-1;0;0]$, $[0;-1;0]$, $[0;0;-1]$
 - (b) $[1;0;0]$, $[0;1;0]$, $[0;0;1]$, $[-1;0;0]$, $[0;-1;0]$, $[0;0;-1]$, $[1;1;0]$
 - (c) $[1;1;1]$, $[1;1;-1]$, $[1;-1;1]$, $[1;-1;-1]$, $[-1;1;1]$, $[-1;1;-1]$, $[-1;-1;1]$, $[-1;-1;-1]$