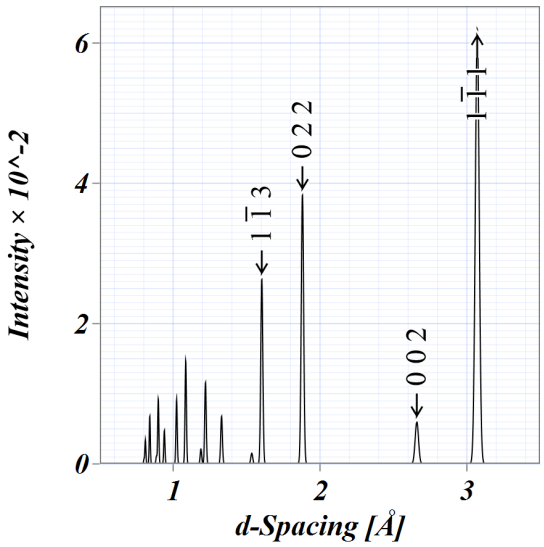
October 19, 2015

PHY 752 – Problem Set #19

Read Chapter 10 in **GGGPP**

1. The graph and table below shows simulated neutron diffraction data for ZnS in the zincblende structure (Fig. 2.9, pg 76-77 in GGGPP) showing the diffraction intensity versus d_{hkl} plane spacing, where the hkl Miller indices are based on the conventional cubic cell.



h	k	l	d(hkl)	I/Imax
1	1	1	3.07035	100.0%
0	0	2	2.65900	16.8%
0	2	2	1.88020	76.0%
1	1	3	1.60344	22.3%
2	2	2	1.53517	1.2%
0	0	4	1.32950	9.5%
1	3	3	1.22003	7.5%
0	2	4	1.18914	2.7%
2	2	4	1.08553	8.4%
3	3	3	1.02345	1.2%
1	1	5	1.02345	3.7%
3	-3	3	1.02345	1.2%

   (a) Using the fractional atomic positions for the ZnS structure, explain the reason for at least two of the "missing" diffraction peaks.

   (b) From the table of neutron diffraction peaks given below, determine the lattice constant of ZnS and compare your result with that given in GGGPP.