

Quiz 3

Thursday, February 03, 2011

Your name:

True or false, except 5. Explain your answers briefly.

1. If a conventional cell is taken instead of a primitive cell, it means that the volume of the conventional cell is an integer times the volume of the primitive cell.
2. When a conventional BL is taken instead of a primitive BL, then the structure factor will necessarily vanish on some of the reciprocal lattice points of the conventional BL.
3. Consider a one dimensional crystal ("quantum wire") observed in a three dimensional world like ours. The lattice constant along the wire is a . The reciprocal BL of this crystal is a series of infinite planes perpendicular to the crystal with spacing $2\pi/a$.
4. In some crystals, acoustic phonons may not exist.
5. Diffraction spots become weak at high order because of the _____.
(a) atomic form factor (b) structural factor
6. Consider an experiment in which you shoot a neutron beam on a macroscopic crystal and excite a phonon. We consider zero temperature. As the result, the neutron beam loses its energy, typically on the order of 10 meV. In the final state of the experiment in comparison to the initial state, each atom in the crystal hardly changes the amplitude of the oscillation around its equilibrium position.