Answer on Question #46471 – Physics - Atomic Physics

What are the advantages of the neutron diffraction method?

Solution:
Advantages of the neutron diffraction method:

I

Neutrons interact with the Nuclei and not the electrons. Neutron diffraction brings information about the position of the nuclei. The electron cloud is around an Angstrom wide so the position of atoms will have that much uncertainty, but the Nuclius has a dimension of 10-15 m.The neutron diffraction is more accurate.

II

Neutron has a magnetic moment. It can interact with the magnetic moment of the atoms in crystals. So it can give us the idea about the magnetic structure along with the crystal structure.

III

Neutron Diffraction is great for measuring crystalline properties - sizes, order vs. disorder, see appendix of next paper:

Small Angle Neutron Scattering (SANS) can measure the nano- to meso-structure of matter, see : Nano-metrology of porous structures - I. Using neutron scattering to access pore lattice, diameter and wall parameters, by comparison with direct calculation of scattering from models of extended arrays of regular or randomised pores. J.Beau W. Webber. Physics Reports, DOI: 10.1016/j.physrep.2013.01.002