A Case for Np 5f Octupole and Hexadecapole Motifs in NpO_2

Lovesey S. W.

Diamond Light Source and ISIS Facility, Rutherford Appleton Laboratory, Oxfordshire OX11 0QX, UK., email: S.W.Lovesey@rl.ac.uk

We consider resonant Bragg diffraction data gathered on NpO_2 held at 12 K and the primary energy tuned to the Np M_4 absorption edge. The actual data used in the interpretation includes both the azimuthal-angle scan observed at the (003) reflection with polarization analysis, and the energy profile around the M_4 edge. The data are consistent with a magnetic order in which the Np dipole moment is zero. In addition, a null value of the Np quadrupole is derived. In the proposed interpretation, diffraction is ascribed to Np 5f octupole and hexadecapole moments.