

ESRF

Experiment title:
Determination of the atomic displacements of the metal atoms associated with the incommensurate structure in the Q1D (TaSe₄)₂I

Experiment number:
HE 6

Beamline:
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Report:

In this experiment we have used the Energy Dispersive Diffraction technique to study the energy dependence of the intensity of some selected Bragg and superlattice reflections of the quasi-one-dimensional conductor (TaSe₄)₂I. This compound undergoes a Peierls transition at T_C=263K with the appearance of new superlattice reflections. The experiment has been performed at the L_{III} edge of Ta (E=9876 eV), and the energy band was 800 eV. The goal of the experiment was to determine if there is an optical component of the Ta atoms atomic displacement in the incommensurate state. It is easy to show that in this case the energy variation of the intensity for the Bragg and satellites has to be different. Figure 1 shows typical images obtained for this compound below the phase transition temperature. Figure 2 shows a cut of the image in figure I where we see an intense signal, the Bragg peak, surrounded by 4 of smaller intensity (the satellites). The reason why these appear so close to the fundamental is because the wavevector of the modulation is very small: $\mathbf{q}=(\pm 0.05, \pm 0.05, \pm 0.085)$. Quantitative data analysis, incommensurate structure refinement taking into account all the wavelengths in the spectra, of the whole image (20 Bragg reflections and the corresponding satellites) is on the way.

Figure 1

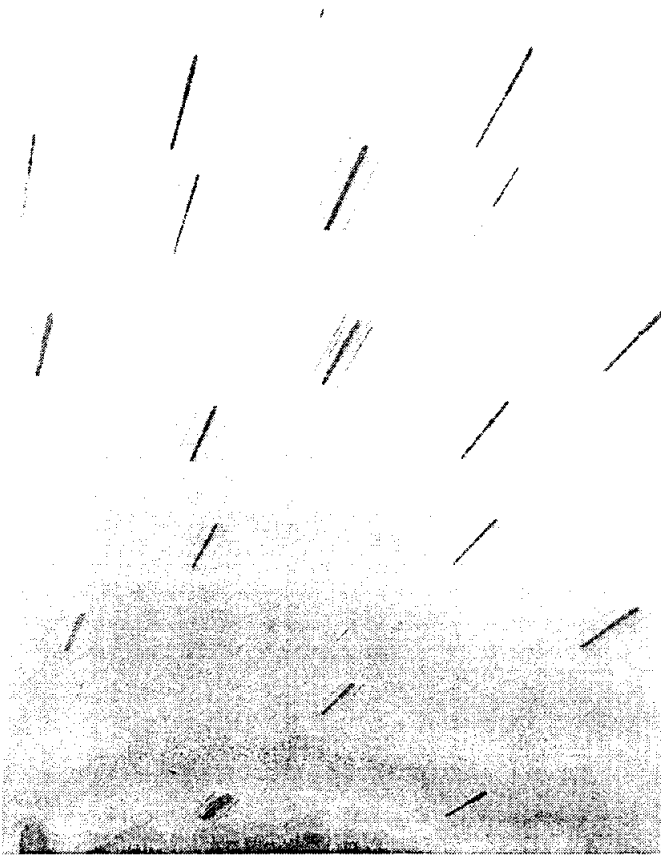


Figure 2

