

COHERENT X-RAY RADIATION IN CRYSTALS INDUCED BY CHANNELED  
PROTONS

Ž.Šmit, F.Gaser, U.Miklavžič

J. Stefan Institute, University of Ljubljana, Ljubljana

and

P.Gosar

Faculty of Natural Sciences and Technology and  
J. Stefan Institute, University of Ljubljana, Ljubljana

The possibility of observing coherent X-ray radiation induced in crystal atoms by channeled MeV protons is discussed. Zareckij et al. <sup>(1)</sup> made a theoretical study based on the first order perturbation theory and Born approximation. Strongly space dependent coherent radiation is axially symmetric around the direction of protons and with sharp maxima at angles determined by  $\cos\theta = \frac{c}{v} - \frac{K_z}{k}$  ( $\frac{v}{c}$  proton velocity,  $K_z$  the z-component of the reciprocal lattice vector,  $k$  photon wave vector). The calculated magnitude of the cross section indicates that the phenomenon could be observed.

We repeated the calculation using the perturbation theory of the second order. Protons were treated quasi-classically. We found similar angular distribution and similar but different cross section formula. The experiment to observe such coherent radiation of L lines in Au and LaOF crystals is under preparation now. The elaborate measuring cell is being constructed to observe the effect.

Reference

1. D.F.Zareckij et al., Jadernaja fizika, 28/2(8), 1978