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2D Focusing of Reflected Hard X-Rays and Thermal Neutron Beams in the Presence of External Temperature Gradient

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It was experimentally shown that in the presence of temperature gradient in X-cut quartz crystal it was possible to obtain 2D bending of reflecting atomic planes (10-11) depending on the position and shape of heater, thereby ensure the possibility of 2D focusing of X-rays at reflection from these planes. It is noteworthy that the degree of bending depends on the thermal expansion coefficient in the given direction. Consequently, in case of appropriate choice of crystal, of its cut and the family of reflecting atomic planes, one can provide such a 2D bending, at which a point focus of reflected X-ray radiation is obtained. It is also shown that under these conditions the integrated intensity of reflected X-ray radiation increases by several orders of magnitude, and the angular width in mutually perpendicular directions is controllable.
Reflection of thermal neutrons beam from the quartz crystal in the Laue geometry under the external influences was investigated theoretically. The possibilities and estimation of the time-spatial control of thermal neutrons beam parameters (relative maximum intensity, angular and energy distributions of receiving beams, etc.) are analyzed.

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