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Mechanism of Self-Collimation and Weakening of Dechanneling During Realistic Channeling of Positive Ions in Crystals

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The work considers the mechanism of self-controlled autocollimation of a beam of positive ions during their channeling in crystals, which can lead to a significant reduction in the angular dispersion of the ions beam. The autocollimation process is associated with elastic ion scattering and stepwise transfer of the transverse energy E_{\perp} of a channeled ion to groups $N \approx \lambda/2 < d_z >$ of crystal atoms that are localized in regions $\lambda/2 = v_z/2 \omega$ of alternating reflections on each channel wall. This process can significantly compensate and reduce the effect of de-

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