

Experimental Study of Zero Degree Focus

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Abstract. Ion beam focusing is a pivotal factor for enhancing ion microscopy methodologies. We have concluded the investigation into particle focusing to confirm the zero-degree focusing effect. This involved examining the angular distributions of H⁺ ions channeled through a thin silicon crystal, utilizing a methodology specifically tailored for this purpose. This phenomenon, fundamental for advancing microscopy techniques, has been experimentally measured and theoretically elucidated. In the process of ion channeling, the particles establish oscillatory motion along the axis of the channel with a period equal to the reduced crystal thickness. The energy of the H⁺ ions is varied in the MeV range, while the thickness of the silicon crystal remained constant at 100 nm. These experimental conditions involve a reduced crystal thickness which encompasses the first and second rainbow cycles. The aim is to measure the zero-degree focusing effect occurring at the end of the rainbow cycle.

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