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## Charge-state distributions of energetic He-4 ions backscattered from Kr gas target

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### Abstract

The energy dependence of the charge-state fractions of He-4 ions backscattered at 90 degrees from Kr gas target atoms was investigated for impact energies varying from 0.4 to 2.0 MeV. The fractions were measured using a small electrostatic post-accelerator system. The measured fractions were compared with previous literature results for backscattered He-4 ions from solid targets, and with results for transmitted He-4 ions through foils. It is observed that the charge-state distributions are strikingly identical for the Kr gas and solid targets, within the investigated energy range. The fractions were also found to be insensitive to the incident ion charge-state within the investigated energy range. The findings suggest that, for both gas and solid targets, any memory of the incident ion charge-state is lost during the early stages of the interactions and that the final charge-state distribution is determined during the final stages. A semi-classical theoretical approach based on the early Bohr theory and suggested by Bianconi et al. [18] was attempted and accounted reasonably well for the experimental results. (C) 2011 Elsevier B.V. All rights reserved.

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