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Nano-gratings and the atom-surface Van der Waals interaction[1]
VINCENT LONIJ, WILL HOLMGREN, BEN MCMORRAN, ALEX CRONIN, University of Arizona — Nano-gratings are used in several atom- and electron-interferometers as coherent beamsplitters. Diffraction from these nano-gratings can be studied to observe the effect of the Van der Waals atom-surface interaction. In addition, these gratings have recently been used in atom-interferometers to detect a velocity dependent VdW induced phase shift. Determination of the VdW potential strength C3 from these studies, is limited by a lack of knowledge of the geometric parameters of the grating. Measurements of these parameters by conventional methods are plagued with several systematic errors. By studying diffraction of a beam of Na atoms at different angles of incidence, we are able to determine the geometric parameters with a precision that is competitive with conventional imaging methods. The precision is great enough to be able to notice the effect of atoms deposited on the gratings by the atom-beam.

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