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Correlations in light propagation in one-dimensional waveguides
JUHA JAVANAINEN, Univ of Connecticut - Storrs, JANNE RUOSTEKOSKI, Univ of Southampton — We study light propagation between atoms in a one-dimensional waveguide both analytically and using numerical simulations. We employ classical electrodynamics, but in the limit of low light intensity the results are essentially exact also for quantum mechanics. We characterize the cooperative interactions between the atoms mediated by the electromagnetic field. The focus is on resonance shifts for various statistics of the positions of the atoms, such as statistically independent positions or atoms in a regular lattice. These shifts, potentially important if 1D waveguides are to be used in metrology, are different from the usual resonance shifts found in three spatial dimensions.

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