Supersolidity in the one-dimensional Bose-Hubbard Model B.
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Monte Carlo method can be constructed based on the Baeriswyl wavefunction to
calculate the ground-state properties of one-dimensional Bose-Hubbard model. The
phase diagram obtained is in excellent agreement with previous quantum Monte
Carlo results. We also investigate the sensitivity of the system to a boundary twist,
and find that it is sizeable even for integer fillings. To understand the nature of
the phase we use a single-particle and a many-particle localization quantity and find
that at integer fillings the system exhibits many-particle localization, at the same
time, single particles as a result of bosonic exchange, can delocalize over the entire
lattice. Away from integer fillings, where the system is known to be superfluid, delo-
calization is found at both the single-particle and many-particle level. We interpret
these results as a signature of supersolidity in the Bose-Hubbard model at integer
filling.

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