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Summary: Many structures in nature are invariant under the transformation pair, $(p, r) \rightarrow (b r, -p/b)$, where $b$ is some scale factor. Born’s reciprocity hypothesis affirms that this invariance extends to the entire Hamiltonian and equations of motion. We investigate this idea for atomic physics and galactic motion, where one is basically dealing with a $1/r$ potential and the observations are very accurate, so as to determine the scale $b \equiv m \Omega$. We find that an $\Omega \sim 1.5 \times 10^{-15} \text{s}^{-1}$ has essentially no effect on atomic physics but might possibly offer an explanation for galactic rotation, without invoking dark matter.

MSC:
81V45 Atomic physics
83F05 Relativistic cosmology

Keywords:
Born reciprocity; atomic physics; galactic rotation; dark matter

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