

PEER REVIEW SUMMARY

Manuscript: Quantum Mechanical Treatment of Molecular Rotations and Vibrations

Author: Richard Murdoch Montgomery, Scottish Science Society **Review Date:** 16 January 2026 **Review Model:** Single-blind peer review for average periodical

Strengths: Rigorous mathematical development from fundamentals through rovibrational coupling; effective figures illustrating energy levels and spectral features; complete reproducible Python code; appropriate integration of contemporary applications in quantum control and ultracold molecules.

Issues: Equation formatting errors throughout; abstract/introduction excessively long; over-reliance on Koch et al. (2019); missing experimental validation; Figure 3 LaTeX artefacts; Lorente & Persson citation misattributed; Coriolis coupling mentioned but undeveloped.

Required Revisions: Correct equation formatting; condense introduction by 30%; add experimental comparison; fix citation issues; correct Figure 3 rendering.

Verdict: ACCEPT WITH MINOR REVISIONS **Rationale:** Technically sound, pedagogically valuable; issues correctable without restructuring.