

High Resolution Gigahertz and Terahertz Spectroscopy and Theory of Parity Violation and Tunneling for 1,2-dithiine ($C_4H_4S_2$) as a Candidate for Measuring the Parity Violating Energy Difference between Enantiomers of Chiral Molecules

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Electroweak parity violation leads to a slight energy difference between the enantiomers of chiral molecules (on the order of 100 aeV to 1 feV depending on the molecule) and also to a slow time dependent intramolecular process changing parity with time on the order of *ms* to *ks* [1, 2]. Recently we have identified 1,2-dithiine (Figure 1) as a possible candidate for measuring $\Delta_{pv}E$ using the experimental set up described in [3]. Here we report spectroscopic and theoretical studies needed for the preparation of such experiments on 1,2-dithiine ([4, 5] and references therein). We shall also refer to the evolution of the biomolecular homochirality, which may be related to parity violation [6].

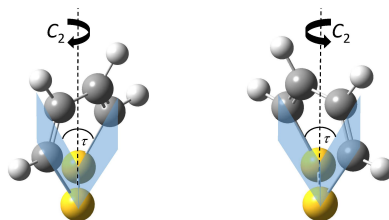


Figure 1. Two enantiomers of 1,2-dithiine ($C_4H_4S_2$), left P, right M enantiomer.

[1] M. Quack Fundamental Symmetries and Symmetry Violations from High-Resolution Spectroscopy, Vol. 1, pp. 659-722 in Handbook of High Resolution Spectroscopy, M. Quack and F. Merkt eds., Wiley Chichester (2011).

[2] M. Quack, J. Stohner, M. Willeke, *Annual Review of Physical Chemistry*, **2008**, 59, 741.

[3] P. Dietiker, E. Miloglyadov, M. Quack, A. Schneider, G. Seyfang, *Journal of Chemical Physics*, **2015**, 143, 244305.

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[6] M. Quack, *Advances in Chemical Physics*, **2014**, 157, 247.

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