

# Quasirelativistic approach to parity violation in open-shell molecules

Timur Isaev, Sophie Nahrwold, Robert Berger

Frankfurt Institute for Advanced Studies, Goethe-University Frankfurt am Main, Ruth-Moufang-Str. 1, 60438 Frankfurt am Main, Germany

Studies on parity violation (P-odd effects) in atoms and molecules can, in principle, offer a powerful route to information on Standard Model parameters that is complimentary to high-energy experiments (see e.g. [1, 2]). Nuclear spin-dependent P-odd effects received recently special interest as available atomic experimental data on the parameters of this type of P-odd interaction are in contradiction [3]. Experiments with diatomic and polyatomic molecules containing heavy nuclei are expected to clarify the situation and various molecular experiments are currently planned (see e.g. [4]). Crucial for all such experiments is the calculation of parameters of the effective P-odd Hamiltonian which is required for the interpretation of the experimental spectrum [5, 6, 2].

We present our recent developments of the theory of effective P-odd Hamiltonians for molecular systems and report computational results obtained within the quasirelativistic zeroth order regular approximation approach for the nuclear spin-dependent P-odd effects in a number of diatomic molecules [7].

- [1] P. Langacker, M. Luo, and A. K. Mann, *Rev. Mod. Phys.* **1992**, *64*, 87.
- [2] M. Quack, J. Stohner, and M. Willeke, *Annu. Rev. Phys. Chem.* **2008**, *59*, 741.
- [3] C. S. Wood *et al*, *Science* **1997**, *275*, 1759; J. S. M. Ginges and V. V. Flambaum, *Phys. Rep.* **2004**, *397*, 63.
- [4] D. DeMille, S. B. Cahn, D. Murphree, D. A. Rahmlow, and M. G. Kozlov, *Phys. Rev. Lett.* **2008**, *100*, 023003.
- [5] M. Kozlov and L. Labzowsky, *J. Phys. B* **1995**, *28*, 1933.
- [6] R. Berger in: *Relativistic Electronic Structure Theory, Part 2, Applications*, (edited by P. Schwerdtfeger), Elsevier, Netherlands, **2004**, 188.
- [7] T. Isaev, S. Nahrwold, and R. Berger, (to be published).