

Atoms and Molecules as Laboratories for Probing Physics Beyond the Standard Model

Timo Fleig¹

¹ *Physics Department, Laboratory of Quantum Chemistry and Quantum Physics,
I.R.S.A.M.C., University Paul Sabatier Toulouse, F-31062 Toulouse, France*

The search for physics beyond the standard model of elementary particles today is a highly interdisciplinary field, involving researchers from high-energy, nuclear, and atomic physics [1]. Electric dipole moments (EDMs) which give rise to spatial parity (P) and time-reversal (T) non-conserving interactions are an important probe of such New Physics in the low-energy regime [2], and their investigation allows for detecting/constraining additional (CP)-violation [3] required for solving several problems in fundamental physics, among them the Baryon Asymmetry of the Universe.

I will present numerous aspects of relativistic electronic-structure investigations on atoms and molecules in the framework of the search for EDMs. These very often include elaborate studies of excited-state spectra of the systems in question and relativistic electronic-structure methods capable of addressing complex electronic structure [4]. Recent developments as well as theoretical results [5,6,7,8] required in conjunction with experimental measurements [9,10,11] on state-of-the-art atomic and molecular systems will be presented.

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