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Complex Scaling in Atomic Physics: In and Out of External Fields

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Abstract. Applications of complex scaling in computational atomic and molecular physics began almost immediately as the mathematical theory developed: life-times of doubly excited states of two-electron atoms starting things off. Quite quickly, computational experiments indicated that similar theory (as will be discussed later in the week by Herbst) must exist for the problems of atomic structure in both constant, and oscillatory external fields. Applications abound in these areas, and early computational developments and examples will be overviewed. Finally, more recent, and highly successful, use of “exterior” complex scaling has allowed the Holy Grail of computational atomic theory to be ever more closely approached: the three-body Coulomb scattering problem at zero energy will be reviewed, and recent progress seen to have been quite remarkable.