



# Algebraic Approach to Simple Quantum Systems

By Adams, Barry G.

Book Condition: New. Publisher/Verlag: Springer, Berlin | With Applications to Perturbation Theory | This book provides an introduction to the use of algebraic methods and symbolic computation for simple quantum systems with applications to large order perturbation theory. It is the first book to integrate Lie algebras, algebraic perturbation theory and symbolic computation in a form suitable for students and researchers in theoretical and computational chemistry and is conveniently divided into two parts. The first part, Chapters 1 to 6, provides a pedagogical introduction to the important Lie algebras  $so(3)$ ,  $so(2,1)$ ,  $so(4)$  and  $so(4,2)$  needed for the study of simple quantum systems such as the D-dimensional hydrogen atom and harmonic oscillator. This material is suitable for advanced undergraduate and beginning graduate students. Of particular importance is the use of  $so(2,1)$  in Chapter 4 as a spectrum generating algebra for several important systems such as the non-relativistic hydrogen atom and the relativistic Klein-Gordon and Dirac equations. This approach provides an interesting and important alternative to the usual textbook approach using series solutions of differential equations. | 1 General Discussion of Lie Algebras.- 2 Commutator Gymnastics.- 3 Angular Momentum Theory and  $so(3)$ .- 4 Representations and Realizations of  $so(2,1)$ .- 5 Representations and...



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