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The 1958 Pekeris-Accad-WEIZAC ground-breaking collaboration that computed ground states of two-electron atoms (and its 2010 redux). (English) Zbl 1226.81006


Summary: In order to appreciate how well off we mathematicians and scientists are today, with extremely fast hardware and lots and lots of memory, as well as with powerful software both for numeric and symbolic computation, it may be a good idea to go back to the early days of electronic computers and compare how things went then. We have chosen, as a case study, a problem that was considered a huge challenge at the time. Namely, we looked at C. L. Pekeris's seminal 1958 work [Phys. Rev., II. Ser. 112, 1649–1658 (1958; Zbl 0082.44604)] on the ground state energies of two-electron atoms. We went through all the computations ab initio with today’s software and hardware.

MSC:
81-03 History of quantum theory
81-04 Software, source code, etc. for problems pertaining to quantum theory
01A60 History of mathematics in the 20th century
81Q05 Closed and approximate solutions to the Schrödinger, Dirac, Klein-Gordon and other equations of quantum mechanics
81V45 Atomic physics

Keywords:
Pekeris-Accad-WEIZAC; ground states of two-electron atoms

Software:
qTSPP; Pekeris; PEKERIS; MultiZeilberger

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References:

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