Hydrogen and Helium atoms in strong magnetic fields[1] ANAND
THIRUMALAI, JEREMY HEYL, University of British Columbia — The energy
levels of hydrogen and helium atoms in strong magnetic fields are calculated in this
study. The current work contains accurate estimates of the binding energies of the
first few low-lying states of these systems that are improvements upon previous
estimates. The methodology involves computing the eigenvalues and eigenvectors of
the generalized two-dimensional Hartree-Fock partial differential equations for these
one- and two-electron systems in a self-consistent manner. The method described
herein is applicable to calculations of atomic structure in magnetic fields of arbitrary
strength as it exploits the natural symmetries of the problem without assumptions
of any basis functions for expressing the wave functions of the electrons or the
commonly employed adiabatic approximation. The method is found to be readily
extendable to systems with more than two electrons.

Anand Thirumalai
University of British Columbia

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