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Electron Transfer, Ionization, and Excitation in Collisions between α Particles and H($1s$) Atoms THOMAS WINTER, Penn State U., Wilkes-Barre Campus — Following earlier coupled-Sturmian calculations by Shakeshaft[1] on p-H collisions, the author reported Sturmian calculations on electron transfer in 20-200 keV α-H collisions.[2] These calculations, carried out 24 years ago on Penn State's IBM 3033 mainframe computer, took 2-4 cpu hours per total cross section per α energy. Now, using a very similar Fortran program, they have been repeated with the same 19- to 24-state bases and numerical parameters on a 3.32 GHz IBM ThinkPad in about 1/300th the cpu time, reproducing the transition probabilities at each impact parameter to at least five digits and the integrated capture cross sections to the full published three digits. The cross sections have also now been confirmed stable to three digits with respect to the choice of the numerical parameters. These calculations can now much more readily be extended to larger bases and a wider range of energies. Direct excitation and ionization will also be considered.

[1]R. Shakeshaft, Phys. Rev. A **14**, 1626 (1976).
[2]T. G. Winter, Phys. Rev. A **25**, 697 (1982).

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