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Calculating Relativistic Transition Matrix Elements for Hydrogenic Atoms Using Monte Carlo Methods S.A. ALEXANDER, Southwestern University, R.L. COLDWELL, University of Florida — The nonrelativistic transition matrix elements for hydrogen atoms can be computed exactly and these expressions are given in a number of classic textbooks. The relativistic counterparts of these equations can also be computed exactly but these expressions have been described in only a few places in the literature. In part, this is because the relativistic equations lack the elegant simplicity of the nonrelativistic equations. In this talk I will describe how variational Monte Carlo methods can be used to calculate the energy and properties of relativistic hydrogen atoms and how the wavefunctions for these systems can be used to calculate transition matrix elements.

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