# Computation and Concepts in Early Atomic and Solid-State Physics

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Abstract:

We trace the work of Douglas Hartree, of Cambridge and Manchester, England, and John Clarke Slater, at MIT, as they developed methods for calculating accurate quantum wavefunctions and energies for many-electron systems. In this paper we describe how, as Slater and Hartree began to use the Differential Analyzer, an analog computing machine surpassing others of the 1930s, they reshaped their research programs to incorporate the new computational capacities it provided. We trace how they used this new unparalleled instrument and how they incorporated it into their previous research programs. We study how they came to trust the results they got from it. Finally, we examine how their, as well as several other physicists connected with MIT, approaches to physics and research outlooks subtly shifted as they used that device to study atoms and solids.