Parallel Implementation of the Dirac Equation OLIVIA COMEAU,
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— The objective of this research is to acquire an understanding of the numeri-
cal components of an effective Dirac equation simulation with hopes that similar
procedures can be implemented for other related differential equation models from
physical phenomena. The Dirac equation is a relativistic wave equation that de-
scribes spin- particles and is related to other equations such as the Klein-Gordon
equation, where it is the square root of the Klein-Gordon. Parallel implementations
of the Dirac equation and corresponding numerical performances are studied with
various numerical options. The C language and the Portable, Extensible Toolkit for
Scientific Computation (PETSc) libraries, such as Krylov Subspace Methods (KSP)
and Preconditioners (PC) are the main tools used in this research. The effectiveness
of our procedure for the parallel execution of the Dirac matrix will be analyzed.

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