Abstract Submitted
for the NWS07 Meeting of
The American Physical Society

From Stern-Gerlach to Rashba-Dresselhaus Propagators BAILEY HSU, JEAN-FRANCOIS VAN HUELE, Brigham Young University — Propagators are used to describe the evolution of quantum systems in space. Schwinger's method, which uses the commutation between the relevant operators to construct the propagators is generally used for spinless particles. We apply Schwinger's method to find propagators for quantum systems with spin in electromagnetic configurations. We first consider neutral particles with magnetic moments in magnetic fields as used in Stern-Gerlach experiments and we construct the propagators and their effect on wave packets. We discuss the extension to charged particles in electromagnetic fields. In spintronics applications, bulk and structure inversion asymmetries lead to spin-orbit coupling interactions. We discuss the dynamics in the special cases of the Rashba and the Dresselhaus effect.

Bailey Hsu
Brigham Young University

Date submitted: 23 Apr 2007 Electronic form version 1.4