

Abstract Submitted  
for the DNP06 Meeting of  
The American Physical Society

**A closed form inverse scattering scheme for the Dirac equation at fixed energy** HELMUT LEEB, HARALD LEHNINGER, CHRISTIAN SCHILDER, Atominstitut of the Austrian Universities, Vienna University of Technology, Vienna, Austria — A new hierarchy of Dirac equations with spherically symmetric scalar and fourth component vector potentials is presented, for which closed form expressions for the solutions, the potentials and the S-matrix can be given in terms of solutions of an original Dirac equation. The hierarchy is generated via a generalized translation operator for the Dirac equation. Using these transformations an inverse scattering scheme has been constructed for the Dirac equation which is the analog to the rational scheme in the non-relativistic case. The method provides for the first time an inversion scheme with closed form expressions for the S-matrix for non-relativistic scattering problems with central and spin-orbit potentials. The inversion scheme was numerically implemented and its features are studied in several examples.

Helmut Leeb  
Atominstitut of the Austrian Universities, Vienna University of Technology

Date submitted: 10 Jul 2006

Electronic form version 1.4