

Heavy quark systems in Quantum
Chromodynamics

by

P. Senjanović

Boris Kidrič Institute, Beograd

and

N. Parsons

University of Oxford

We propose and study a scheme designed to deal with QCD effects in heavy quark systems in a systematic fashion. The scheme is based on a technique proposed by M. Halpern and one of the authors (P.S) |1| and extended by Halpern, Jevicki and P.S. |2|. The technique consists in converting quark field variables to quark particle variables.

We obtain several interesting results: a) we derive the spin test of Wilchek and Zee |3| from QCD. b) we derive an instanton-generated spin-orbit interaction c) we take into account recoil effects d) we obtain terms of the type $\vec{p}^{(k)} \leftrightarrow \vec{\lambda}_p^{(i)}$ (also instanton-generated) e) we develop an approximation which is semiclassical both in field and particle variables.

References:

- 1) M.B. Halpern and P.Senjanović, Phys.Rev. d15 (1977), 1655
- 2) M.B.Halpern, A.Jevicki and P.Senjanović, Phys.Rev. D16 (1977), 2476
- 3) F.Wilchek and A.Zee, Phys.Rev. Lett. 40 (1978), 83.