

Abstract Submitted  
for the DNP15 Meeting of  
The American Physical Society

**Yang-Mills equation for the collective model** NICK SPARKS,  
GEORGE ROSENSTEEL, Tulane University — To determine the collective model connection, an equation is needed that relates the connection to the nuclear current. The correct equation is the Yang-Mills equation for the collective model bundle. The essential mathematical structure of both Yang-Mills and the collective model is a bundle with a differential geometric connection, but the particulars are quite different. In particular, the base manifold for Yang-Mills is Minkowski space, whereas the base manifold for the collective model is the space of all nuclear orientations and quadrupole deformations. The Lie structure groups are both non-abelian: Yang-Mills electroweak is  $U(2)$  and the collective model is  $SO(3)$ . The YM equation is derived from the YM Lagrangian which depends on the bundle curvature. Solutions are found for rotation about one principal axis. These solutions range continuously from the irrotational flow to the rigid body connections as the current ranges from irrotational to rigid.

Nicholas Sparks  
Tulane Univ

Date submitted: 29 Jun 2015

Electronic form version 1.4