

Abstract Submitted
for the DAMOP08 Meeting of
The American Physical Society

**Geometric phases and Bloch sphere constructions for $SU(N)$,
with a complete description of $SU(4)$** DMITRY USKOV, Tulane University,
RAVI RAU, Louisiana State University — A two-sphere (“Bloch” or “Poincare”) is familiar for describing the dynamics of a spin-1/2 particle or light polarization. Analogous objects are derived for unitary groups larger than $SU(2)$. We focus, in particular, on the $SU(4)$ of two qubits which describes all possible logic gates in quantum computation. For a general Hamiltonian of $SU(4)$ with 15 parameters we derive Bloch-like rotation of unit vectors analogous to the one familiar for a single spin in a magnetic field.

Dmitry Uskov
Tulane University

Date submitted: 04 Feb 2008

Electronic form version 1.4