Abstract Submitted
for the APR13 Meeting of
The American Physical Society

Black Hole Entropy from complex Ashtekar variables[1] MARC GEILLER, IGC, Penn State — In loop quantum gravity, black holes can be described in terms of an SU(2) Chern-Simons theory on a punctured 2-sphere. The level k of the Chern-Simons theory depends on both the Barbero-Immirzi parameter γ and the horizon area a_H. In this framework, the number of microstates of the black hole is a function which is expressed in terms of the dimension of the SU(2) Chern-Simons theory Hilbert space. We propose an analytic continuation of this number of microstates to a purely imaginary value of γ, and we give an interpretation based on the analytic continuation of SU(2) Chern-Simons theory to a complex gauge group. We show that the number of microstates behaves as $\exp(a_H/(4lp^2))$ for large area a_H if $\gamma = \pm i$, and finally discuss the relation between this striking result and quantum gravity in terms of the original complex Ashtekar variables.

[1]Supported in part by the NSF grant PHY-1205388.

Abhay Ashtekar
IGC, Penn State

Date submitted: 10 Jan 2013 Electronic form version 1.4