1046-58-827 **William E. Gryc*** (wgryc@gmail.com), Department of Mathematics, Dansby Hall, Morehouse College, 830 Westview Dr., Atlanta, GA 30314. *On the Holonomy of the Coulomb Connection over Manifolds with Boundary.*

Consider the quotient $\mathcal{A} \to \mathcal{A}/\mathcal{G}$ of Yang-Mills theory, where $\mathcal{A}$ is a space of connections of a principal bundle P and $\mathcal{G}$ are the gauge transformations. Narasimhan & Ramadas showed that the restricted holonomy group of the Coulomb connection is dense in the connected component of the identity of the gauge group when $P = S^3 \times SU(2) \to S^3$. Instead of a base manifold S^3, we consider a manifold of dimension $n \geq 2$ with a boundary and use *Dirichlet boundary conditions* on connections. A key step in the method of N. & R. consisted in showing that the linear space spanned by the curvature form at one specially chosen connection is dense in the holonomy Lie algebra. Our objective is to explore the effect of the presence of a boundary on this construction of the holonomy Lie algebra. We show that the linear space spanned by the curvature at any one connection is never dense in the holonomy Lie algebra. In contrast, the linear space spanned by the curvature form and its first commutators at the flat connection is dense. The former, negative, theorem is proven for any principal bundle, while the latter, positive, theorem is proven only for a product bundle over the closure of a bounded open subset of $\mathbb{R}^n$. (Received September 11, 2008)