1148-53-311 **Benjamin Sheller*** (bsheller@iastate.edu) and **Domenico D'Alessandro**. *The Cut Locus in $K-P$ sub-Riemannian Problems.*

We consider here a class of sub-Riemannian problems on Lie groups G where the dynamical equations are of the form $\dot{x} = \sum_j X_j(x)u_j$ and the $X_j = X_j(x)$ are right invariant vector fields on G and $u_j := u_j(t)$ the controls. The vector fields X_j are assumed to belong to the P part of a Cartan $K-P$ decomposition. These types of problems admit a group of symmetries K which act on G by conjugation. Under the assumption that the minimal isotropy group in K is discrete, we prove that we can reduce the problem to a Riemannian problem on the regular part of the quotient space G/K. On this part we define the corresponding quotient metric. For the special cases of the K-P decomposition of $SU(n)$ of type **AIII** we prove that the assumption on the minimal isotropy group is verified. Moreover, under the assumption that the quotient space G/K with the given metric has negative curvature we prove that the cut locus has to belong to the singular part of G. As an example of applications of these techniques we characterize the cut locus for a problem on $SU(2)$ of interest in the control of quantum systems. (Received February 05, 2019)