PRE-QUANTIZATION OF G^{2g}

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Let $f : G^2 \to G$ denote the commutator map on a compact, connected, simple Lie group G. There's a distinguished relative co-cycle (w, x) in $C^3(f) := C^2(G^2) + C^3(G)$, the algebraic mapping cone of $f^* : C^*(G) \to C^*(G^2)$, where $C^*()$ denotes the deRham chain complex of differential forms. The definition of (w, x) involves choosing an inner product on $Lie(G)$. The co-cycle (w, x) determines a cohomology class in $H^3(f; R)$, and one may ask: Is this cohomology class in the image of the coefficient homomorphism $H^3(f; Z) \to H^3(f; R)$? The answer depends on the choice of inner product. In particular, one can calculate precisely which inner products yield an "integral lift" of (w, x) and which don't. (I probably won't discuss the motivation of the problem, but such an integral lift is called a pre-quantization in the right context.)