Classification of gauge groups over 4-manifolds

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Let M be an orientable, smooth, closed 4-manifold and let G be a simple, simply-connected, compact Lie group. Given a principal G-bundle P over M with its second Chern class k, the associated *gauge group* $\mathcal{G}_k(M)$ is defined to be the group of G-equivariant automorphisms of P which fix M. Although there are infinitely many classes of principal G-bundles over M, there are only finitely many homotopy types of gauge groups over M. Over the last twenty years, topologists have been studying the homotopy types of gauge groups over 4-manifolds for many cases, especially when M is a simply-connected spin 4-manifold. In this seminar I will talk about the classification of gauge groups over simply-connected 4-manifolds and introduce my work on the cases where M is a simply-connected non-spin 4-manifold or a non-simply-connected 4-manifold.