ABSTRACT: Lie groups are one of the cornerstones of modern mathematics and mathematical physics. Throughout its history, boundaries of Lie theory have been constantly expanding to include new important structures and cover new important applications. My goal in these lectures will be to introduce yet another important direction from which new Lie-theoretic structures are currently coming. It has to do with K-theoretic counting of curves or 3-dimensional supersymmetric QFTs. Unfamiliar terminology notwithstanding, there are good applications to very classical problems in mathematics.