

- **Upmeier, Markus: Orientation problems in gauge theory (203)**

Besides compactness, orientations are an essential ingredient for the construction of enumerative invariants from moduli spaces. After discussing the general elliptic theory of orientations and a powerful excision technique in this context, I shall focus on a case of current interest, the Donaldson-Segal program in special holonomy. It proposes to extend familiar techniques for anti-self-dual connections on 4-manifolds to higher-dimensional special geometries. This includes Calabi-Yau 3-folds, G2-manifolds, and Spin(7)-holonomy manifolds. Finally, I will outline a recent result (joint with D. Joyce) that solves the orientation problem for G2-instantons in 7-dimensions.