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Categorification of invariants in gauge theory and symplectic geometry⋆

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Abstract. This is a mixture of survey article and research announcement. We discuss instanton Floer homology for 3 manifolds with boundary. We also discuss a categorification of the Lagrangian Floer theory using the unobstructed immersed Lagrangian correspondence as a morphism in the category of symplectic manifolds.

During the year 1998–2012, those problems have been studied emphasizing the ideas from analysis such as degeneration and adiabatic limit (instanton Floer homology) and strip shrinking (Lagrangian correspondence). Recently we found that replacing those analytic approach by a combination of cobordism type argument and homological algebra, we can resolve various difficulties in the analytic approach. It thus solves various problems and also simplify many of the proofs.

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