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Katrin Wehrheim* (wehrheim@math.ias.edu), Institute for Advanced Study, School of Math,
Princeton, NJ 08540. *Instanton Floer homology with Lagrangian boundary conditions.*

We define an instanton Floer homology for 3-manifolds M with boundary $\partial M = \Sigma$, using anti-self-dual instantons on $\mathbb{R} \times M$ with Lagrangian boundary conditions. By degenerating the metric on M we then obtain some progress towards a proof of the Atiyah-Floer conjecture for homology 3-spheres. In this context, a Lagrangian in the space of connections over Σ is given by those flat connections that extend to another handle body bounding Σ . The new invariant however is defined for a more general class of gauge invariant 'monotone' Lagrangians and may thus be suitable for extension to general 3-manifolds. (Received February 06, 2006)