

## Heegaard Floer theory, Open manifolds and Teichmuller spaces

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**Abstract.** For smooth, open 4-manifolds, we construct an invariant using the Heegaard Floer theory of Ozsvath and Szabo and show that this is sensitive enough to detect exotic  $\mathbb{R}^4$ 's. In the second part of the lecture, we discuss a method to count holomorphic curves in products of surfaces using Teichmuller theory. The problem of counting curves is closely related to the problem of finding a combinatorial description of Heegaard Floer theory.