

Massachusetts Institute of Technology
Department of Mathematics

**LUNCH SEMINAR FOR GRADUATE
STUDENTS**

MONDAY, NOVEMBER 19, 2012
12:00 - 1:00 PM ROOM 2-143

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**“Quantitative Stratification and regularity for
harmonic maps”**

Abstract

In this talk I'll briefly review some basics of harmonic mappings between Riemannian manifolds, and then discuss recent developments on their regularity theory and the ideas behind them. Specifically I'll discuss a relatively recent paper which is joint with Jeff Cheeger. The paper is devoted to new techniques for taking ineffective local behavior, e.g. tangent cones or tangent maps, and deriving from this effective estimates on regularity. For minimizing harmonic maps $f : M \rightarrow N$ a consequence of the results are L^p estimates for the gradient of f , with $p > 2$, and L^q estimates for the Hessian of f , with $q > 1$. These are the first Sobolev estimates for harmonic mappings between Riemannian manifolds, and in fact the estimates are sharp. In fact, the estimates are much stronger and give L^p bounds for the regularity scale $r_f(x) \equiv \max\{r > 0 : \sup_{B_r(x)} r|\nabla f| + r^2|\nabla^2 f| \leq 1\}$, which controls the size of neighborhoods for which f is smoothly bounded. The proof includes a new quantitative dimension reduction, that in the process strengthens the Hausdorff estimates on singular sets to Minkowski estimates.

Followed by pizza in room 2-290