

# COLLOQUIUM

---

## *University of Notre Dame* *Department of Mathematics*

Robert McCann

University of Toronto, Canada

Will give a lecture entitled  
**Geometric variational problems in economics**

On  
Wednesday, May 4, 2011

at 4:15 PM in Room 117 Hayes-Healy Hall

### **Abstract:**

The monopolist's problem of deciding what types of products to manufacture and how much to charge for each of them, knowing only statistical information about the preferences of an anonymous field of potential buyers, is one of the basic problems analyzed in economic theory. The solution to this problem when the space of products and of buyers can each be parameterized by a single variable (say quality  $X$ , and income  $Y$ ) garnered Mirrlees (1971) and Spence (1974) their Nobel prizes in 1996 and 2001. The multidimensional version of this question is a largely open problem in the calculus of variations (see Basov's book "Multidimensional Screening"). I plan to describe recent work with A Figalli and Y-H Kim, identifying structural conditions on the value  $b(X, Y)$  of product  $X$  to buyer  $Y$  which reduce this problem to a convex program in a Banach space--- leading to uniqueness and stability results for its solution, confirming robustness of certain economic phenomena observed by Armstrong (1996) such as the desirability for the monopolist to raise prices enough to drive a positive fraction of buyers out of the market, and yielding conjectures about the robustness of other phenomena observed Rochet and Chone (1998), such as the clumping together of products marketed into subsets of various dimension. The passage to several dimensions relies on ideas from differential geometry / general relativity, optimal transportation, and nonlinear PDE.