

Bay Area Differential Geometry Seminar
Saturday October 28, 2017
MSRI, Berkeley

*Seminar participants and their significant others are invited to dinner at the home of David Hoffman, 37 Hill Road, Berkeley, CA 94708 (tel: 510 649-1641). Directions will be provided at the meeting. Please use the **signup list** to indicate your participation and dietary restrictions if any. (Click on the boldfaced text in the previous sentence to get to the signup list.) It is important that we have an accurate count of people coming for dinner. If you are coming, please do tell us in advance.*

- 10:00–11:00 **Reception, Morning Coffee**

- 11:00–12:00 **François Monard, UC Santa Cruz:** *Tensor tomography and boundary rigidity on manifolds, a brief overview*

We consider the following two problems. 1) Given (M, g) a manifold with boundary, the boundary rigidity problem asks the question: can one determine the metric g from knowledge of the geodesic distance between any two boundary points? 2) Assuming g is known now, the tensor tomography problem asks what can be reconstructed of a given a symmetric m -cotensor from knowledge of its integrals along all possible g -geodesics (its so-called geodesic X-ray transform).

These two problems, with applications to seismology and medical imaging (X-ray Computerized Tomography), are closely related: for $m = 0$ or 2 , the second problem is a linearization of the first one. The answer to both problems strongly depends on the dimension of M (“2” versus “3 and higher”), giving rise to sometimes disjoint sets of tools, and on underlying geometric features such as conjugate points and/or trapped geodesics. In this talk, we will review recent results and open questions about both problems, illustrations at hand.

- 12:00–2:00 **Lunch** *Lunch will be available for purchase at MSRI. Orders will be taken before the first talk. There will be a brief organizational meeting at 1:45.*

- 2:00–3:00 **Brian White, Stanford:** *A Dichotomy Theorem for Minimal Surfaces*

I will discuss a surprising dichotomy for classical minimal surfaces that gives new insights into the Colding-Minicozzi theory. (No knowledge of that theory will be assumed.)

- 3:00–4:00 **Afternoon Tea**

- 4:00–5:00 **Bruno Benedetti, University of Miami:** *Smoothing Discrete Morse Theory*

In 1999 Forman introduced a discrete version of Morse theory as a tool to study the homotopy of arbitrary simplicial complexes. In particular, Discrete Morse Theory applies to triangulations of smooth manifolds. So given a smooth manifold, we are free to choose how to study it, either with the original Morse theory, or with its discrete counterpart on some triangulation. In the talk we compare the precision of the two theories and explain when it is possible to pass from a smooth Morse vector to a discrete one, and the other way around.

- 6:00 **Dinner** *Please see the invitation and signup link at the top of this announcement. Click on the boldfaced phrase **signup list**.*