Seminar/Talk

The isometry group of Wasserstein spaces: the Hilbertian case

Daniel Virosztek
IST Austria

Host: Laszlo Erdös

I will report on the most recent step of our systematic study of Wasserstein isometries, which is joint work with Gyorgy Pal Geher (U Reading) and Tamas Titkos (Renyi Inst., Budapest). Now we consider Wasserstein spaces over a separable real Hilbert space H and describe the isometries for every positive finite parameter p. The quadratic case (p=2) turns out to be an infinite-dimensional analogon of Kloeckner's result on the isometries of W_2(R^n) from 2010, which says that W_2(R^n) admits non-trivial isometries as well as trivial ones (which are governed by isometries of the underlying space). For p≠2, we use a two-step argument. First, we give a metric characterization of Dirac masses and deduce that they are invariant under Wasserstein isometries (modulo trivial isometries). This metric characterization is essentially different for concave cost (p<1) and for convex cost (p>=1). Then we introduce a quantity which we call the Wasserstein potential of a measure and which is invariant under Wasserstein isometries. We show that the potential function completely determines the measure for every non-even positive p, and hence we deduce isometric rigidity, which means that Isom(W_p(H))=Isom(H). For p=4,6,8,... we prove isometric rigidity, although in this case, the Wasserstein potential does not carry enough information to recover the measure.If time allows, I will demonstrate the efficiency of the potential function method on different underlying spaces (including spheres, tori, and projective planes) as well.

Thursday, October 22, 2020 04:30pm - 05:30pm
online via Zoom

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