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Multi-marginal optimal transport on a Riemannian manifold

I will discuss joint work with Young-Heon Kim on an optimal transport problem with several marginals on a Riemannian manifold, with cost function given by the average distance squared from multiple points to their barycenter. Under a standard regularity condition on the first marginal, we prove that the optimal measure is unique and concentrated on the graph of a function over the first variable, thus inducing a Monge solution. This result generalizes McCann's polar factorization theorem on manifolds from two to several marginals, in the same sense that a well known result of Gangbo and Swiech generalizes Brenier's polar factorization theorem on \mathbb{R}^n .