Metric-Measure Approximation to Riemannian Manifolds: Spectral convergence

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Abstract. This is a joint work with D. Burago (PennState Univ, USA) and S. Ivanov (PDMI, Russia). We consider a discrete metric measure-space (X, d, μ) which forms an ϵ-approximation to a compact connected Riemannian manifold (M, g). For any $\rho > \epsilon$ we define a ρ-graph, $\Gamma = \Gamma_{\epsilon,\rho}$, associated with X, and introduce a weighted Dirichlet form Γ and the corresponding graph Laplacian. We show that when ρ, $\epsilon/\rho \to 0$, the eigenvalues of Γ converge to those of the Laplace operator Δ on M and, after a proper extension, the eigenfunctions of Γ converge to those of M. We also provide the estimates of the convergence rates assuming that M belongs to some class of bounded geometry.