

**Optimal transport, Fokker-Planck diffusion processes and  
Perelman's Ricci flow**

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We study the optimal transport problem between the Fokker-Planck diffusion processes on compact Riemannian manifolds equipped with Perelman's Ricci flow and potential. More precisely, we prove that, when the Riemannian metric evolves along Perelman's Ricci flow and the potential function evolves along the conjugate heat equation, then the Wasserstein distance between the probability distributions of the backward Fokker-Planck diffusion processes is nonincreasing in time. Moreover, we prove the convexity of some Boltzmann-Shannon entropy type free energy functionals along the geodesic on the Wasserstein space on manifolds equipped with Perelman's Ricci flow and potential. Our results extend some previous ones due to McCann-Topping, Topping and Lott.