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4:00 PM  
117 Hayes-Healy Hall

**Title:** Comparison geometry of the Bakry-Emery Ricci curvature on complete Riemannian manifolds

**Abstract:**

In 1984, D. Bakry and M. Emery introduced the notion of the Ricci curvature associated with a diffusion operator, now called the Bakry-Emery Ricci curvature, to study diffusion processes on Riemannian manifolds. Since then, the Bakry-Emery Ricci curvature has played an important role in the interaction between analysis, geometry and probability theory: Poincare, logarithmic Sobolev and isoperimetric inequalities on Riemannian manifolds, Myers theorem and eigen-value estimates, gradient estimates and Li-Yau Harnack inequality along the heat equation, etc. In 2002, G. Perelman used the Bakry-Emery Ricci curvature to modify Richard Hamilton's Ricci flow equation and derived the monotonicity of the W-entropy along the Ricci flow.

In this talk, I'll briefly recall the introduction of the Bakry-Emery Ricci curvature and recall some known results in the past decades. Then I'll present some recent results on the comparison geometry of the Bakry-Emery Ricci curvature on complete Riemannian manifolds: an extension of S.-T. Yau's gradient estimate and Strong Liouville theorem, the  $L^1$ -Liouville theorem as well as a generalization of the Cheeger-Gromoll splitting theorem using the Bakry-Emery Ricci curvature. Finally, I'll present some recent work on Perelman's W-entropy associated with the heat equation on Riemannian manifolds with weighted measure.