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**Xiangjin Xu\*** ([xxu@math.binghamton.edu](mailto:xxu@math.binghamton.edu)), Department of Mathematical Sciences, Binghamton University-SUNY, Binghamton, NY 13902-6000. *Gradient estimates for the degenerate parabolic equation on manifolds and some Liouville-type theorems*. Preliminary report.

In this talk, we first prove a localized Hamilton-type gradient estimate for the positive solutions of the ecumenic degenerate parabolic equation:

$$u_t = \Delta F(u),$$

with  $F'(u) > 0$ , on a complete Riemannian manifold with Ricci curvature bounded below,  $Ric(M) \geq -k$  with  $k \geq 0$ .

The second part of this talk, we apply the gradient estimates to the Fast Diffusion Equations (FDE) ( $0 < p < 1$ ) and Porous Media Equations (PME) ( $p > 1$ ):

$$u_t = \Delta(u^p), \quad p > 0,$$

to obtain the gradient estimates in a larger range of  $p$  than the range of  $p$  for Harnack inequalities and Cauchy problems in the literature, and also prove some Liouville-type theorems for positive global solutions on noncompact complete manifolds with nonnegative Ricci curvature for the FDEs and the PMEs, which generalize Yau's celebrated Liouville Theorem for positive harmonic functions. (Received July 31, 2010)