Decay estimates for parabolic equations with inhomogeneous density in manifolds

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We consider the problem

$$\rho(x)u_t = \Delta_{p,m}(u)\,, \qquad x \in M\,, t > 0\,, \tag{1}$$
$$u(x,0) = u_0(x) \geq 0\,, \qquad x \in M\,. \tag{2}$$

in a suitable Riemannian manifold M, where $\Delta_{p,m}$ is the suitable analogue of the doubly nonlinear elliptic operator and ρ is a density function vanishing at infinity.

We obtain the asymptotic decay rate for positive solutions. We also discuss in this talk optimal Sobolev and Hardy inequalities in M under assumptions on the isoperimetric profile of the manifold.