A Positive Mass Theorem for Fourth-Order Gravity

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In classical Einstein gravity, the metric is a critical point of the Einstein-Hilbert functional, i.e. $g \mapsto \int_M R_g \, dv$. It has been proved that there exists a conserved quantity along space-like hypersurface, called the ADM mass. In a celebrated work Schoen and Yau proved that if the scalar curvature of the hypersurface is none-negative then the mass is none-negative, with rigidity if the mass vanishes. After remembering some facts about this result, I will introduce a new mass associated to a fourth order functional, namely $g \mapsto \int_M \alpha R_g^2 + \beta |\mathrm{Ric}_g|^2 \, dv_g$. Then I will explain how we obtain an analogue of the positive mass theorem for this new mass by replacing the none-negativity of the scalar curvature by the one of the Q-curvature.