Abstract. In this paper we show that if two strictly convex, compact real projective manifolds have the same marked length spectrum with respect to the Hilbert metric, then they are projectively equivalent. This is a rigidity for Finsler metric with a special geometric structure. Furthermore we prove an analogue of a Hitchin's conjecture for hyperbolic 3-manifolds, namely the deformation space of convex real projective structures on a compact hyperbolic 3-manifold M is a component in the moduli space of $\mathrm{PGL}(4,\mathbb{R})$-representations of $\pi_1(M)$.