

## The inverse Henderson problem

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**Abstract:** The Henderson theorem of statistical mechanics is the theoretical foundation of many coarse-graining techniques for the numerical simulation of complex soft matter physics. The associated inverse problem concerns the determination of the interacting forces between pairs of classical particles in continuous space, given the equilibrium pair correlation function of the particles. Henderson's theorem from 1974 claims that the solution of this problem is uniquely determined, provided such a solution exists. We review recent results on the mathematical setting of this nonlinear problem, including a rigorous proof of this theorem and the specification of a strictly convex functional which attains its minimum at the solution. We also discuss possible implications on iterative strategies for the numerical solution of this inverse problem.