Abstract Submitted
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A Hessian geometric construction that aids analysis of non-monotonic effects in ternary mixture phase separation[1] GEORGE THURSTON, Rochester Inst of Tech, DOUGLAS HAYDEN, Massachusetts General Hospital, DAVID ROSS, Rochester Inst of Tech, AJAY PANDE, JAYANTI PANDE, University at Albany, GIUSEPPE FOFFI, Université Paris-Sud, ANNA STRADNER, PETER SCHURTENBERGER, Lund University — Ternary, quaternary, and multi-component phase separations are common in biological systems, and their properties have many physiological and pathological consequences. As one example, understanding the molecular origins of the phase boundaries of eye lens protein solutions can help understand loss of transparency of the eye lens in cataract, a leading cause of blindness. The phase boundaries respond in a sensitive and non-monotonic fashion to small changes in molecular interaction strengths. We show how the geometry of relevant intersections, in the space of the components of the Hessian of the intensive Gibbs free energy with respect to relative compositions, can assist in comprehending the origins of such non-monotonic and sensitive changes of the phase boundaries. We apply this construction to analyze recent results about non-monotonic dependence of the phase boundaries of eye lens protein solutions on interprotein interaction strengths.

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