Singular Diameters in Liquid-Liquid Critical Phenomena

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Recent work on the scaling formulation of pure fluid criticality, namely complete scaling, predicts the existence of a new, unexpected, singular behavior of the density-temperature coexistence curve diameter [1]. By appealing to the principle of critical point universality, this result is straightforwardly generalized to liquid-liquid critical points, i.e. the concentration-temperature coexistence curve diameter is predicted to exhibit a new, unexpected singular behavior. In this work, previously reported data of coexistence curves of a wide variety of systems, including mixtures of molecular liquids, polymer solutions, and ionic solutions, are carefully analyzed. It is shown how theory and experiment match each other with no contradictions.

[1] Y.C. Kim, M.E. Fisher, G. Orkoulas, *Phys. Rev. E*, **67,** 061506, (2003).