

### **Phase Behavior and Protein Interactions**

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Proteins in solution crystallize, form coexisting liquid phases, aggregate and gel. As a case study of protein phase behavior, I will present the gamma crystallins, a family of proteins from the mammalian lens. I will describe the phase behavior of several native and mutant gamma crystallins and talk about the connection between this behavior and human cataract.

The phase behavior provides information about the interactions between proteins. I will show that the general features of the phase diagram of globular proteins, such as metastable liquid-liquid coexistence, can be explained by modeling proteins as simple colloids, i.e. spherical particles with short-range, isotropic attraction. I will also discuss the aspects of the phase behavior which require more realistic models and explain how such models may be useful for protein crystallization.

**Keywords:** phase diagram, liquid-liquid phase separation, crystal solubility