

## Microscopic Theory of Blue Phases I and II of Liquid Crystal

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**Abstract:** The microscopic theory of the blue phases of chiral liquid crystal is proposed. Beginning with the potential between two molecules, by using the cell model of liquid, applying statistical physical method, the distribution function and the free energy of the system are obtained. By using variational approach and zero-order approximation, the differential equation that the order parameter tensor of the blue phase can satisfy is obtained. Then we change the differential equation to the eigenequation problem in quantum mechanics. Considering the symmetry of the blue phases, the order parameter tensors of blue phases I and II can be made up of the eigenvectors. Our results are the same as the results of Ginzberg-Landau's phenomenological theory. The parameters in the order parameter tensors that we calculate in the located system are close to the predecessors' results.

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Key words: liquid crystal, blue phase, chiral, order parameter tensor

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