Zeitschrift: Helvetica Physica Acta
Band: 56 (1983)
Heft: 1-3

Artikel: Liquids with cubic orientational order : the cholesteric
Autor: Shtrikman, S. / [s.n.]
DOI: https://doi.org/10.5169/seals-115411

Nutzungsbedingungen
Die ETH-Bibliothek ist die Anbieterin der digitalisierten Zeitschriften auf E-Periodica. Sie besitzt keine Urheberrechte an den Zeitschriften und ist nicht verantwortlich für deren Inhalte. Die Rechte liegen in der Regel bei den Herausgebern beziehungsweise den externen Rechteinhabern. Das Veröffentlichen von Bildern in Print- und Online-Publikationen sowie auf Social Media-Kanälen oder Webseiten ist nur mit vorheriger Genehmigung der Rechteinhaber erlaubt. Mehr erfahren

Conditions d'utilisation
L'ETH Library est le fournisseur des revues numérisées. Elle ne détient aucun droit d'auteur sur les revues et n'est pas responsable de leur contenu. En règle générale, les droits sont détenus par les éditeurs ou les détenteurs de droits externes. La reproduction d'images dans des publications imprimées ou en ligne ainsi que sur des canaux de médias sociaux ou des sites web n'est autorisée qu'avec l'accord préalable des détenteurs des droits. En savoir plus

Terms of use
The ETH Library is the provider of the digitised journals. It does not own any copyrights to the journals and is not responsible for their content. The rights usually lie with the publishers or the external rights holders. Publishing images in print and online publications, as well as on social media channels or websites, is only permitted with the prior consent of the rights holders. Find out more

Download PDF: 18.02.2026

ETH-Bibliothek Zürich, E-Periodica, https://www.e-periodica.ch

Helvetica Physica Acta,
Vol. 56 (1983) 695

0018-0238/83/010695-01$1.50+0.20/0
© Birkhäuser Verlag Basel, 1983

LIQUIDS WITH CUBIC ORIENTATIONAL ORDER - THE CHOLESTERIC BLUE PHASE*

S. Shtrikman**

Department of Electronics, The Weizmann Institute of Science,
Rehovot, Israel.

Many organic chiral liquids form upon cooling a phase, called cholesteric, which is characterized by one-dimensional helical orientational order, but has no positional order. When the pitch is short enough, other phases appear in a narrow temperature range between the disordered liquid and the cholesteric phase. These so-called blue phases have strong optical activity and, in contradistinction to the cholesteric, are optically isotropic. They exhibit Bragg scattering and their growth habit is cubic, suggesting three-dimensional order with a unit cell very large compared to molecular size.

Using Landau theory, we show why such a three-dimensional orientational order emerges. We present models of this orientational order for various blue phases and discuss the implication for the selection rules for Bragg reflection. These turn out to be different from the classical crystallographic ones. The physical reason for this difference will be explained and the role of polarization emphasized. Some properties for the blue phases, including optical activity, light scattering and phase diagrams in the temperature-chirality plane will be discussed and compared with experiment.

A detailed description of the work outlined here is given in "Landau Theory of Cholesteric Blue Phases" by H. Grebel, R.M. Hornreich and S. Shtrikman, in "Theory of Light Scattering in Cholesteric Blue Phases" by R.M. Hornreich and S. Shtrikman and in "Optical Activity of Cholesteric Liquid Crystals in the Pretransitional Regime and in the Blue Phase" by D. Bensimon, E. Domany, and S. Shtrikman, Phys. Rev. A, in press.

---

* This work was supported in part by a grant from the U.S.-Israel Binational Science Foundation (BSF), Jerusalem, Israel.

** The Samuel Sebba Professor of Applied Physics.