Foreword: Liquid Crystals Go to School

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Liquid crystals are materials which are seen every day everywhere. Young and old people spend hours in front of computer, cellular phone or TV screen every day, not being aware of the material which allows for the colours, sharpness [1] etc.

On the other hand, the whole developed part of the world is confronting a decreasing interest in science and technological studies [2]. There are various reasons pointed out by experts. One of them is a detachment of topics taught in school with respect to time and place. Most of the science topics were discovered long ago and are old from the perspective of a student. They are usually also of no relevance to anything in a real life [3].

Liquid crystals are modern materials, present everywhere and are also a topic in current research. Therefore they are good candidates for being interesting and motivating. They have very special properties; therefore they can be included in organic chemistry, in optics and in thermodynamics as illustrations of various phenomena. Some phenomena can be shown only as a motivation to very young children. Liquid crystals are more than welcome in undergraduate physics and chemistry programs as they help to the introduction of difficult concepts like order parameters, phase transitions or dynamical properties. Last but not least, interdisciplinarity in science and in education is nowadays ”hot”. Liquid crystals fit perfectly as they exist due to the ”symbiosis” between chemistry and physics.

In this symposium we will discuss the concepts in physics which are important for understanding liquid crystals and their properties. For example, mechanical models from rather simple, like knitting patterns, to more sophisticated, like Euler strut dynamical behaviour (contributions by Susman et al and Ziherl et al) can help to development of conceptual understanding [4]. On the other hand, we will discuss the concepts in physics which could be nicely illustrated and supported by liquid crystals (contribution by Pavlin et al). Most of them are found in optics and thermodynamics, but there are several other fields in physics as well, where the knowledge about liquid crystals can be used straightforwardly or with a little modification (contribution by Pečar et al).

References [1] P. J. Collings, Liquid Crystals: Nature’s Delicate Phase of Matter, 2nd Edition, Princeton University Press, (2001). [2] Rocard report on science education, European commission, Directorate – General for Research, Unit L4: Scientific culture and gender, (2009). [3] A. M. W. Bulte et al. In B. Ralle & I. Eilks (Eds.), Quality in practice-oriented research in science education (Proceedings of the 17th Symposium on Chemical Education in Dortmund), 105-116. Aachen, Germany: Shaker Publishing, (2004). [4] J. Bobnar et al, Eur. Jou. Phys. 32, 1007 (2011).

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