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Boson peak in two liquid crystal glass-formers – results of the neutron scattering

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The inelastic neutron scattering spectra were measured for two liquid crystal chiral glass-formers: (S)-4-(2-methylbutyl)-4'-cyanobiphenyl (5*CB) and (S)-4-(1-methylheptyloxy)-4'-cyano-biphenyl (8*OCB) in the temperature range from 4 to 30 K. The experiments were performed for phase I, glass of phase II and glass of cholesteric phase for 5*CB and phase II, glass of phase I and glass of isotropic liquid for 8*OCB.

Boson peak was observed for phase I and glass of phase II for 5*CB and for glass of isotropic liquid for 8*OCB (Fig. 1). For other experimental runs the boson peak was not observed or was of much less intensity. For all runs the broadening of the elastic peak, characteristic for conformational jumps or reorientation of molecular groups, was observed. The estimated correlation time of these motions was of the order of picoseconds. The tunnel splitting suggested for temperatures lower than 1 K by relaxation calorimetry experiment was not observed.

Primary author: Dr KRAWCZYK, Jan (Institute of Nuclear Physics PAN)

Co-authors: Prof. MASSALSKA-ARODŹ, Maria (Institute of Nuclear Physics PAN); Mr ROZWADOWSKI, Tomasz (Institute of Nuclear Physics PAN)

Presenter: Dr KRAWCZYK, Jan (Institute of Nuclear Physics PAN)

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