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We report polarised Raman spectroscopy of a liquid crystal elastomer displaying a mechanical Frèedericksz transition and a partial auxetic response as a function of strain. These data sets are relevant to the paper “Understanding the Physics of the Auxetic Response in a Liquid Crystal Elastomer” published under Physical Review Research. The data sets include, (a) the data from all figures shown in the paper within the “figs data” folder and (b) the depolarisation data as .xlsx and the raw as .txt a function of strain.

Files include:

1. “Figs data” with all the data points for figs. 5 – 10.
2. “Raw data” –
   1. “PRS\_depol\_parallel\_strain” contains the Polarized Raman Spectroscopy depolarisation ratio data for the LCE strained parallel to the initial director. This data is fitted to determine the order parameter data used in fig. 7 in the main body of the paper.
   2. “PRS\_depol\_perp\_strain” contains the Polarized Raman Spectroscopy depolarisation ratio data for the LCE strained perp to the initial director. This data is fitted to determine the order parameter data used in fig. 7 in the main body of the paper.
   3. “PRS\_director\_perp\_strain” contains full depol Polarized Raman Spectroscopy depolarisation data used to determine the director angle for the overall nematic phase (1606cm-1 bond), the main-chain (1730cm-1 bond) and the side-chain (2250cm-1) as a function of strain.