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Neutron Flow-Mapping of Controlled-Architecture Polymer Melts TOM MCLEISH, Dept of Physics and Astronomy and Polymer IRC, Univ. of Leeds, NIGEL CLARKE, Dept of Chem./Polymer IRC, Univ. of Durham, PIERRE CHAMBON, Dept of Chem./Polymer IRC, Univ. of Sheffield, EDOARDO DE LUCA, Dept of Chem./Polymer IRC, Univ. of Durham, JOHN EMBERY, Dept of Physics and Astronomy and Polymer IRC, Univ. of Leeds, CHRISTINE FERNY-HOUGH, Dept of Chem./Polymer IRC, Univ. of Sheffield, TIM GOUGH, Dept of Mech. Engr./ Polymer IRC, Univ. of Bradford, RICHARD GRAHAM, School of Mathematical Sciences, Univ. of Nottingham, ISABELLE GRILLO, Institut Laue-Langevin, France, LIAN HUTCHINGS, Dept of Chem./Polymer IRC, Univ. of Durham, KAMAKSHI JAGANNATHAN, HARLEY KLEIN, Dept of Physics and Astronomy and Polymer IRC, Univ. of Leeds — We report on results of a new method for probing complex flows of entangled polymer melts that is able to compare simultaneously chain configurations on different length scales and stress distribution in the flow with the predictions of molecular models. Controlled-architecture melts synthesised by anionic polymerisation and selectively deuterated are made in sufficient quantities to fill a recirculating flow device that contains a windowed processing zone. This may take the form of a constriction or a cross-slot. The whole processing rig is scanned across a narrow neutron beam before a small-angle detector that reports on the structure factor of labelled chains (this sometimes requires the subtraction of two differently-labelled experiments). The same flow is probed in birefringence, measuring the independent orientation at the bond level of the chains.

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