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Magnetism and magneto-transport in the chiral helimagnet $Cr_{1/3}NbS_2$: Microscopic insights from angle-resolved photoemission and time-resolved optical spectroscopy NICHOLAS SIRICA, PAOLO VILMERCATI, MICHAEL KOEHLER, DEEPAK SOPKOTA, DAVID MANDRUS, NORMAN MANNELLA, The University of Tennessee, FEDERICA BONDINO, IGOR PIS, SILVIA NAPPINI, PRANAB DAS, IVANA VOBORNIK, JUN FUJII, Elettra Sincrotrone Trieste, HAMOON HEDAYAT, DAVIDE BUGINI, CLAUDIA DELLERA, ETTORE CARPENE, Politechnico di Milano, SUNG-KWAN MO, Lawrence Berkely National Laboratory , DAVID PARKER, Oak Ridge National Laboratory — The recent discovery of the soliton lattice, and the intriguing interplay between magnetic and transport degrees of freedom, make the chiral helimagnet Cr1/3NbS2 a very promising material both for technological applications, and for elucidating the connection between non-trivial spin textures and the microscopic interactions allowed in a crystalline lattice lacking in inversion symmetry. In this talk, we present recent results of photoemission and time-resolved optical spectroscopy on Cr1/3NbS2. Most notably, the data reveal that the Fermi surface is partially composed of Cr states, and that such states may give rise to a possible half metallicity as suggested by the characteristically long demagnetization dynamic measured from time-resolved magneto-optical Kerr effect (MOKE). Finally, it will be discussed how these findings are inconsistent with a description of magnetism and magnetotransport in this material based solely on spin ordering arguments.

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