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Low Temperature Intrinsic Paramagnetism in B-DNA SAWAKO NAKAMAE, MAXIMILIEN CAZAYOUS, ALAIN SACUTO, PHILIPPE MONOD, ESPCI, DOMINIQUE DURAND, HELENE BOUCHIAT, Universite Paris Sud —
The electrical conduction through DNA remains controversial spanning from insulator, semi-conductor, metal to proximity induced superconductor (1). Such variance illustrates the complexity of interactions between DNA and their environment, *i.e.*, buffer solutions, electrodes, as well as more internal factors such as molecular structures and base-pair sequences. Magnetization is an alternative, non-invasive mean to probe the intrinsic electronic properties of matter, as the measurements do not require any electrode attachments. We have explored the magnetization combined with simultaneous structural measurements via micro-Raman on λ-DNA molecules to study the interplay between the molecular structures (A- and B-DNA) and the magnetic property. Unexpectedly, in the B-DNA state, the magnetization of λ-DNA molecules exhibits paramagnetic behavior below 20 K that is non-linear in applied magnetic field whereas molecules in A-DNA state remain diamagnetic down to 2 K. We discuss the possible orbital origin of this magnetism and its relation to the existence of long-range coherent transport in B-DNA at low temperature. References: (1) See, for example, R. G. Endres, D. L. Cox and R. R. P. Singh, *Reviews of Modern Physics* 76, 195-214 (2004).

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