Graphene controls surface magnetism at room temperature

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In a refreshing change of perspective, theoretical physicist Dr. Zeila Zanolli has looked at the proximity effects of graphene on a magnetic semiconducting substrate, finding it to affect the substrate's magnetism down to several layers below the surface. Her paper was published on 5 October in *Physical Review B*. She was also one of three recipients of the first MaX Prize for frontier research in computational materials science.

Interface physics is the study of the interactions that take place at the junction of two materials when brought into contact. Interfaces have always existed, but it is only with advances in the observation and manipulation of matter at the nanoscale that it has become possible to explore the unique phenomena they are home to. Since the advent of graphene, the attention of the research community has been focused on how other materials can be used to imprint new properties onto this intoxicatingly versatile material. In the belief that this is only half the story, Dr. Zeila Zanolli of the ICN2 Theory and Simulation Group led by Prof. Pablo Ordejón has instead looked at the effects graphene has on the substrate.

Published in *Physical Review B*, her latest work shows how, when some oxide materials are brought into contact with graphene, reactions at the interface can lead their magnetic state to become altered. Investigating further, Dr. Zanolli also observed these effects to be present several atomic layers below the interface itself.

Specifically, the graphene induces a magnetic softening in the oxide substrate, switching its internal spin alignment from antiferromagnetic to ferromagnetic. This state should persist close to room temperature, leading to applications in magnetic memories or spin filters.

More information: Hybrid quantum anomalous Hall effect at graphene-oxide interfaces. *Physical Review B*. 00, 005400 (2018) DOI: 10.1103/PhysRevB.00.005400

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