Abstract Submitted
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Anomalous magnetization of a carbon nanotube as an excitonic insulator[1] MASSIMO RONTANI, CNR-NANO Research Center S3, Modena, Italy — We show theoretically that an undoped carbon nanotube might be an excitonic insulator—the long-sought phase of matter proposed by Keldysh, Kohn, and others fifty years ago. We predict that the condensation of triplet excitons, driven by intervalley exchange interaction, spontaneously occurs at equilibrium if the tube radius is sufficiently small [1]. The signatures of exciton condensation are its sizable contributions to both the energy gap and the magnetic moment per electron. The increase of the gap might have already been measured, albeit with a different explanation [2]. The enhancement of the quasiparticle magnetic moment is a pair-breaking effect that counteracts the weak paramagnetism of the ground-state condensate of excitons. This property could rationalize the anomalous magnitude of magnetic moments recently observed in different devices close to charge neutrality. [1] M. Rontani, Phys. Rev. B **90,** 195415 (2014). [2] V. V. Deshpande *et al.*, Science **323,** 106 (2009).

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Massimo Rontani
CNR-NANO Research Center S3, Modena, Italy

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