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Fractional topological phases, triplet superconductivity and spontaneous time reversal symmetry breaking in strained graphene POUYAN GHAEMI, Departmant of Physics, University of Illinois, Urbana, IL 61801, USA, JEROME CAYSSOL, LOMA (UMR-5798), CNRS and University Bordeaux, F-33045 Talence, France, DONNA SHENG, Department of Physics and Astronomy, California State University, Northridge, California 91330, USA, ASHVIN VISHWANATH, Department of Physics, University of California, Berkeley, CA 94720, USA — Despite wide interests to realize fractional time-reversal symmetric phases, an experimentally realizable system with these exotic topological orders is still lacking. Recent experiment has confirmed that strain can be used to control the electronic states of graphene and create flat pseudo-Landau levels in the absence of external magnetic field. In this talk, I show that graphene under strain is a natural playground for the observation of exotic phases such as fractional valley Hall insulator as well as flat band superconductivity. For neutral graphene, we find a competition between the Ising valley ferromagnet and the spin ferromagnet ruled by the value of short range Hubbard and long range Coulomb interactions. At fractional filling with different intervalley and intravalley interactions, a spin triplet superconductor, a valley-polarized Laughlin state or a time-reversal symmetric fractional valley-Hall state could be realized.

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