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Vortices, zero modes and fractionalization in bilayer-graphene exciton condensate[1] BABAK SERADJEH, University of Illinois at Urbana-Champaign, HEIDRUN WEBER, University of Cologne, MARCEL FRANZ, University of British Columbia — A real-space lattice formulation is given for the recently discussed exciton condensate in a symmetrically biased graphene bilayer. We show that in the continuum limit an oddly-quantized vortex in the condensate binds exactly one zero mode per valley index of the bilayer. In the full lattice model the zero modes are split slightly due to intervalley mixing. We support these results by an exact numerical diagonalization of the lattice Hamiltonian. We also discuss the effect of the zero modes on the charge content of these vortices and deduce some of their interesting properties, including their fractional exchange statistics.

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