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Topological Exciton Bands in Moiré Heterojunctions[1] FENGCHENG WU, Materials Science Division, Argonne National Laboratory, TIMOTHY LOVORN, ALLAN H. MACDONALD, Department of Physics, University of Texas at Austin — Moiré patterns are common in Van der Waals heterostructures and can be used to apply periodic potentials to elementary excitations. We will show that the optical absorption spectrum of transition metal dichalcogenide bilayers is profoundly altered by long period moiré patterns that introduce twist-angle dependent satellite excitonic peaks.[2] Topological exciton bands with non-zero Chern numbers that support chiral excitonic edge states can be engineered by combining three ingredients: i) the valley Berry phase induced by electron-hole exchange interactions, ii) the moiré potential, and iii) the valley Zeeman field. We will also show that the moiré pattern can enable the optical probe of intra-Landau level excitations in the fractional quantum Hall regime.[3]

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[2]F. Wu, T. Lovorn, and A. H. MacDonald, arXiv: 1610.03855.
[3]F. Wu and A. H. MacDonald, arXiv: 1611.00776.

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