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Optical Radiation from Integer Quantum Hall States in Dirac Materials MICHAEL GULLANS, JACOB TAYLOR, NIST - Natl Inst of Stds Tech, POUYAN GHAEMI, City College of the City University of New York, MOHAMMAD HAFEZI, University of Maryland, College Park — Quantum Hall systems exhibit topologically protected edge states, which can have a macroscopic spatial extent. Such edge states provide a unique opportunity to study a quantum emitter whose size far exceeds the wavelength of emitted light. To better understand this limit, we theoretically characterize the optical radiation from integer quantum Hall states in two-dimensional Dirac materials. We show that the scattered light from the bulk reflects the spatial profile of the wavefunctions, enabling spatial imaging of the disorder landscape. We find that the radiation from the edge states are characterized by the presence of large multipole moments in the far-field. This multipole radiation arises from the transfer of angular momentum from the electrons into the scattered light, enabling the generation of coherent light with high orbital angular momentum.

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