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**Growing up in the Spotlight: Optics of Graphene from Dot to Sheet** RICO POHLE, ELEFTHERIA KAVOUSANAKI, KESHAV DANI, NIC SHANNON, Okinawa Inst of Sci & Tech — Graphene quantum dots have recently generated much interest due to their novel properties like the presence of zero-energy states, as well as their potential applications in quantum computing and bio-imaging. Here, we theoretically study triangular and hexagonal graphene quantum dots with zigzag and armchair edges within the tight binding model. We identify, and obtain the exact wave functions, for a class of highly degenerate electronic states with energy equal to the hopping parameter. We study the scaling of the degeneracy of these states versus dot size for the different types of dots, and understand their role in the optical absorption spectrum going from small quantum dots to the thermodynamic limit of an infinite graphene sheet. We investigate the role that these states play in connection to the excitons caused by the van Hove singularity in infinite graphene, and their influence on the nanoscale opto-electronic properties of graphene quantum dots.

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