

Abstract Submitted
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Optimization of a Quantum Biomimetic Photocell NATHANIEL GABOR¹, VIVEK AJI, YAFIS BARLAS, University of California Riverside — We propose and describe the structure, function, and optimization of a biologically inspired two-channel quantum photocell. The photocell, which operates as a dual quantum heat engine, simultaneously performs the critical tasks of absorption, power conversion, and energy flux regulation. By considering the realistic case of stochastic solar photon irradiance, we determine the spectrum of optimal absorption characteristics and charge transfer probabilities necessary for the input supply to exactly meet the output demand. Strikingly, the regulation optimization spectrum peaks in the red and blue portions of the terrestrial solar irradiance, and exhibits close correspondence to the action spectrum of chlorophyll-based photosynthetic organelle. Moreover, a comparison of structure and function of the proposed two-color photocell to photosynthetic chlorophyll complexes in green plants may answer the question: why on Earth are terrestrial plants green?

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