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Utilizing Diffuse Reflection to Increase the Efficiency of Luminescent Solar Concentrators[1] SETH BOWSER, SETH WEIBLE, JOEL SOLOMON, JONATHAN SCHRECENGOST, BRUCE WITTMERSHAUS, School of Science, Pennsylvania State University: Erie, The Behrend College — A luminescent solar concentrator (LSC) consists of a high index solid plate containing a fluorescent material that converts sunlight into fluorescence. Utilizing total internal reflection, the LSC collects and concentrates the fluorescence at the plates edges where it is converted into electricity via photovoltaic solar cells. The lower production costs of LSCs make them an attractive alternative to photovoltaic solar cells. To optimize an LSCs efficiency, a white diffusive surface (background) is positioned behind it. The background allows sunlight transmitted in the first pass to be reflected back through the LSC providing a second chance for absorption. Our research examines how the LSCs performance is affected by changing the distance between the white background and the LSC. An automated linear motion apparatus was engineered to precisely measure this distance and the LSCs electrical current, simultaneously. LSC plates, with and without the presence of fluorescent material and in an isolated environment, showed a maximum current at a distance greater than zero. Further experimentation has proved that the optimal distance results from the backgrounds optical properties and how the reflected light enters the LSC.

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