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Type: PIC2 Project

Development of an LED-based External Quantum Efficiency measurement setup and validation tests on practical photovoltaic devices

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Failure and loss analysis in photovoltaic (PV) cells requires detailed knowledge of various electrical parameters, including the external quantum efficiency (EQE). EQE quantifies how effectively a solar cell converts incident photons into charge carriers and is defined as the ratio of collected charge carriers to the number of incident photons.

The standard EQE measurement procedure involves a monochromator-based system. Although this technique provides very precise results, it has some significant drawbacks: it is time-consuming, it reduces the intensity of the light reaching the cell, and it involves a complex setup with many moving parts.

Therefore, scientists are exploring alternative approaches to develop faster techniques that ideally require less complex and less costly setups. One promising method involves the use of LED illumination sources, which not only allow for spectral tuning to closely match the solar spectrum but also enable the integration of power measurements with rapid, spectrally resolved analysis.

Because of its potential to overcome key limitations of conventional methods, the development of a measurement device that makes use of this approach represents a valuable area of research—making it a fitting and meaningful focus for my thesis work.

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