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Statistical Analysis for Finding the Shape of a Glowing Object ZAKARY NOEL, SUZANNE WHEELER, GABBRIANNA ESCAMILLA, DANIEL DOVE, CRISTIAN BAHRIM, Lamar University — Preliminary experiments indicated that we can differentiate between a glowing object of polygonal shape with n sides based on the interpretation of polarimetric measurements, but no quantitative analysis had been done. We now expand upon this proof of concept with a deeper and more meaningful statistical interpretation of data which allows us to create a well-calibrated experiment and therefore better find the actual shape of a glowing object. We have improved the data acquisition process using a computer based approach where we uniformly rotate a polarizer in front of a glowing object with an electric motor, and we use an improved optical setup to focus the contour of the glowing object on the aperture bracket of the light sensor. This alignment greatly reduces the uncertainty in data acquisition and in the error bar in data processing of the light information. From this result we can better extract the shape of the object as a ratio of the luminosity of the glowing signal on the light sensor with respect to a control signal. This experimental method can be used for more accurate astronomical measurements from finding the shape of stellar objects as well in metallurgy.

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