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Building Measurement Apparatus: A Case Study MATTHEW MAHAFFEY, RON SINTON, Sinton Instruments, SINTON INSTRUMENTS ENGINEERING TEAM TEAM — The experimental process of designing, constructing, and implementing a measurement apparatus is discussed. A Sinton Instruments FMT-350 solar module tester is the chosen example to illustrate the successful implementation of scientific apparatus to mimic phenomena of interest. We examine the process of attempting to simulate the AM 1.5 G solar spectrum with xenon flash bulbs and optical filters. Due to the operating conditions of the components chosen to mimic the characteristics of this phenomenon, it is crucial to understand the ways in which the apparatus deviates from the desired result. At lower intensities and delayed measurement windows over time the spectral emission demonstrates red shifting due to the ratio of black body radiation to the spectral emission bands from the xenon flash. By monitoring these shifts, we develop an understanding of a correction factor that can be applied to acquired data appropriately. Additionally, we discuss the allowable tolerances as outlined by independent certification boards and how they relate to these types of devices.

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