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Abstract

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Angle-resolving photoelectron energy analyzer: Mode calculations, ray-tracing analysis and performance evaluation

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Abstract

This paper describes comprehensive input-lens analysis, ray-tracing studies, empirical mode tests and performance evaluation for a Kuyatt—Simpson-type photoelectron energy analyzer. The analyzer has been designed specifically for angle-resolved photoemission studies using synchrotron radiation. Several operating modes are established using a computer code which combines matrix-optics techniques with ray tracing and least-squares analysis. The code is used to calculate the optimum input-lens voltages required to achieve a prescribed resolution at constant transmission. The modes are also established empirically and are characterized by computer ray-tracing. Performance tests conducted using synchrotron radiation demonstrate that the analyzer is capable of obtaining high-resolution (50 meV) angle- resolved (± 1.5°) photoelectron spectra at good counting rates (~ 10 kHz) without multichannel detection.

Article Outline

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