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Experimental Identification of Specific Spin-Orbit Coupling Mechanisms During Photoionization J.R. MACHACEK, T.J. GAY, D.H. JAECKS, University of Nebraska-Lincoln, K.W. MCLAUGHLIN, Loras College, O. YENEN, University of Nebraska-Lincoln — Recent fluorescence polarimetry experiments have shown that even with a relatively light target like Ar, large relativistic effects are surprisingly common in photoionization. We show how dynamic magnetic effects during photoionization can be specifically identified as target spin-orbit coupling, target spin-continuum orbit coupling, or continuum spin-orbit coupling, the latter being the Fano effect. Our analysis involves the extraction of partial-wave cross sections from experimental polarization measurements for excited residual ion fluorescence. We demonstrate the application of this technique for fluorescence from the fine-structure resolved states of $Ar^+\, 3p^4\ [^3P]\ 4p\, ^2D_{3/2}$, $^4P_{5/2}$, $^4D_{5/2}$. Support provided by the NSF (Grants PHY-0354946 and PHY-0098545) and the DOE (LBNL/ALS)

Joshua Machacek
University of Nebraska-Lincoln

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