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Machine Vision System for Characterizing the Electric Field for the ^{225}Ra EDM Experiment[1] ANDREW SANCHEZ, Univ of Connecticut - Storrs — If an atom or fundamental particle possesses an electric dipole moment (EDM), that would imply time-reversal violation. At our current capability, if an EDM is detected in such a particle, that would suggest the discovery of beyond the standard model (BSM) physics. The unique structure of ^{225}Ra makes its atomic EDM favorable in the BSM search. An upgraded Ra-EDM apparatus will increase experimental sensitivity and the target electric field of 150kV/cm will more than double the electric field used in previous experiments. To determine the electric field, the potential difference and electrode separation distance must be known. The optical method I have developed is a high-precision, non-invasive technique to measure electrode separation without making contact with the sensitive electrode surfaces. A digital camera utilizes a bi-telecentric lens to reduce parallax error and produce constant magnification throughout the optical system, regardless of object distance. A monochrome LED backlight enhances sharpness of the electrode profile, reducing uncertainty in edge determination and gap width. A program utilizing an edge detection algorithm allows precise, repeatable measurement of the gap width to within 1% and measurement of the relative angle of the electrodes.

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