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Can we use the Slow-Rotation Approximation in Electromagnetic Observations of Black Holes? DIMITRY AYZENBERG, Montana State University, KENT YAGI, Princeton University, NICOLAS YUNES, Montana State University — Future electromagnetic observations of BHs may allow us to test General Relativity in the strong-field regime. Such tests, however, require knowledge of rotating BH solutions in modified gravity. Several rotating BH solutions in modified theories have only been found in the slow-rotation and small-coupling approximations. This talk presents the results of an investigation into whether the systematic error introduced due to the approximate nature of these BH metrics is small enough relative to the observational error to allow us to use electromagnetic observations to constrain deviations from General Relativity. We address this by considering whether electromagnetic observables constructed from a slow-rotation approximation to the Kerr metric can fit observables constructed from the full Kerr metric with systematic errors smaller than current observational errors. We focus on BH shadow and continuum spectrum observations. Our results suggest that the modified gravity solutions found in the slow-rotation and small-coupling approximations may be sufficient to constrain realistic deviations from General Relativity with continuum spectrum and BH shadow observations.

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