

Abstract Submitted
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The Contribution of The Cosmological Constant/Dark Energy to The Bending of Light and its Applications.¹ MUSTAPHA ISHAK, University of Texas at Dallas, WOLFGANG RINDLER, JASON DOSSETT, JACOB MOLDENHAUER, CHRIS ALLISON, University of Texas at Dallas — We report new results on the effect of the cosmological constant Λ on the bending of light by a spherically symmetric mass. We show that when the Schwarzschild-de Sitter geometry is taken into account, Λ does indeed contribute to the bending of light. We use this result to discuss an amended lens equation and new time delay expressions. Although the newly derived Λ -terms are perhaps small for current observations, they do not cancel out. We apply the result to observations of Einstein radii around several systems where the lens is a cluster of galaxies. We find that the contribution of the Λ -term to the bending angle can be as large as the second-order term in the Einstein deflection angle for many lens systems and even larger in some cases. We show that our results derive from various methods including the exact matching of solutions to Einstein's equations, approximations used in gravitational lensing, and Fermat's Principle.

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