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Optimizing Electromagnetically Induced Transparency Signals with Laguerre-Gaussian Beams MATTHEW HOLTFRERICH, TOM AKIN, SEAN KRZYZEWSKI, ALBERTO MARINO, ERIC ABRAHAM, Univ of Oklahoma — We have performed electromagnetically induced transparency in ultracold Rubidium atoms using a Laguerre-Gaussian laser mode as the control beam. Laguerre-Gaussian modes are characterized by a ring type transverse intensity profile and carry intrinsic orbital angular momentum. This angular momentum carried by the control beam can be utilized in optical computing applications which is unavailable to the more common Gaussian laser field. Specifically, we use a Laguerre-Gaussian control beam with a Gaussian probe to show that the linewidth of the transmission spectrum can be narrowed when compared to a Gaussian control beam that has the same peak intensity. We present data extending this work to compare control fields in both the Gaussian and Laguerre-Gaussian modes with constant total power. We have made efforts to find the optical overlap that best minimizes the transmission linewidth while also maintaining signal contrast. This was done by changing the waist size of the control beam with respect to the probe. The best results were obtained when the waist of a Laguerre-Gaussian control beam is equal to the waist of the Gaussian probe resulting in narrow linewidth features.

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