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Cascade Raman sidebands generation and orbital angular momentum relations for paraxial beam modes JAMES STROHABER, Florida A&M University, HANS SCHUESSLER, ALEXANDRE KOLOMENSKII, FENG ZHU, Texas A&M University — In this work, the nonlinear parametric interaction of optical radiation in various transverse modes in a Raman-active medium is investigated both experimentally and theoretically. Verification of the orbital angular momentum algebra (OAM-algebra) [Strohaber et al., Opt. Lett. 37, 3411 (2012)] was performed for high-order Laguerre Gaussian modes. It was found that this same algebra also describes the coherent transfer of OAM when Ince-Gaussian modes were used. New theoretical considerations extend the OAM-algebra to even and odd Laguerre Gaussian, and Hermite Gaussian beam modes through a change of basis. The results of this work provide details in the spatiotemporal synthesis of custom broadband pulses of radiation from Raman sideband generation.

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