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Superluminal Ultrasensitive Optical Gyroscope in an Inverted Double-Raman Lambda System TONY ABI-SALLOUM, Department of Physics and Astronomy, Widener University, Chester, PA 19013, USA, YE WANG, JOSHUA YABLON, SHIH TSENG, ZIFAN ZHOU, Department of EECS, Northwestern University, Evanston, IL 60208, USA, SELIM SHAHRIAR, Department of Physics and Astronomy, Northwestern University, Evanston, IL 60208, USA; Department of EECS, Northwestern University, Evanston, IL 60208 — The probe field in an inverted double-Raman lambda atomic system experiences a gain along with a negative dispersion. We show in this talk how a critical negative dispersion can lead to a dramatic enhancement in the sensitivity to cavity length change — induced by rotation, for example — for a ring laser employing this gain. The critical anomalous dispersion enhances the lasing frequency shift by as much as five orders of magnitude when compared to a conventional ring laser with the same dimensions. We show how a careful selection of the experimental parameters, such as strengths of the two controlling fields, can lead to the critical dispersion of interest. We also describe how such a laser can be used to realize a superluminal ring laser gyroscope with highly enhanced sensitivity. Finally, we describe our experimental efforts toward realizing such a superluminal ring laser using a rubidium vapor cell and dual frequency Raman pumps.

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