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Superluminal squeezed light propagation with Rb atoms TRAVIS HORROM, GLEB ROMANOV, IRINA NOVIKOVA, EUGENIY MIKHAILOV, College of William and Mary, COLLEGE OF WILLIAM AND MARY QUANTUM OPTICS LAB TEAM — We present an all atomic method for the generation and manipulation of broadband squeezed states of light ranging in frequency from a few hundred Hz to several MHz and matching an atomic transition of Rb atoms. Our squeezer is based on the polarization self-rotation (PSR) effect in an atomic medium. We have developed a method allowing us to cast an arbitrary temporal pulse shape of the squeezed state by applying a longitudinal magnetic field to the squeezing Rb cell. Such a modulated squeezed state can then serve as a quantum probe to an atomic ensemble of hot Rb vapor. We show that under certain conditions, the squeezed light shows a superluminal propagation speed through the Rb vapor. Also, the application of an additional optical field to the atomic ensemble allows us to control and selectively filter the squeezed state of light. These techniques are of potential interest for precision metrology and the quantum information community.

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