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Velocity-Selective Optical Hyperfine Pumping in (87)Rb Vapor KRISHNA MYNENI, U.S. Army Research, Development, and Engineering Command — The absorption spectra of a probe laser in the presence of a saturating, uni-directional, linearly-polarized pump laser have been measured for the <sup>87</sup>Rb  $D_2$ transition in a room-temperature vapor cell. Using two independently tunable, copropagating, narrow-line lasers for pump and probe, the Doppler-broadened ground state velocity distributions of atoms in the pump beam are directly observed. Strong velocity-selective optical hyperfine pumping is observed due to the non-degenerate level structure of the excited and ground states. It is found that the pump beam may be tuned within the multi-level  $F = 2 \rightarrow F'$  transition to create peaked, highly non-thermal velocity distributions for the two ground state hyperfine levels. The widths and heights of these features in the absorption spectra are examined.

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