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Pulsed ^{87}Rb vector magnetometer using a fast rotating field TAO WANG, WONJAE LEE, MICHAEL ROMALIS, Princeton University, MARK LIMES, TOM KORNACK, ELIZABETH FOLEY, Twinleaf LLC, TWINLEAF LLC COLLABORATION — A rotating magnetic field is applied to obtain vector magnetic field measurements using a pulsed ^{87}Rb scalar magnetometer. The vector magnetometer provides simultaneous measurements of the total field and two polar angles defining the magnetic field vector. We study systematic effects associated with the operation of the rotating field vector magnetometer. One systematic effect is due to Berry's phase in the presence of a rotating field. Another is a systematic offset in the measured transverse magnetic field that depends on the rotation sense of the applied rotating magnetic field. We compare experimental results with a density matrix model including non-linear Zeeman effects and spin-exchange effects in order to quantitatively study these systematics.

Tao Wang
Princeton University

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