Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

**Generating, and Processing, Quadrature Signals in Interferometry** DAVID VAN BAAK, TeachSpin, Inc. and Calvin College — The Michelson interferometer is well-known for its ability to produce sinusoidal signals or 'fringes' in response to changes in the optical path difference between its arms. Less well known is the 'other output' of a Michelson interferometer, where a second set of fringes can be observed. In the simplest case of a lossless interferometer, these standard and non standard output signals are complementary, and therefore redundant. This presentation points out that the use of a lossy metal-film beamsplitter in an interferometer renders the two output signals non-redundant; they can in practice be made to occur in phase quadrature. This immediately makes a Michelson interferometer sensitive to the direction, as well as the rate, of change of optical path difference. Remarkably simple modelling makes it possible to extract the phase shift of the beamsplitter, and the instantaneous phase difference in the interferometer, from the pair of output signals. The method is illustrated via the quantification of magnetostriction by interferometry.

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Date submitted: 15 Nov 2006 Electronic form version 1.4