An experimental setup for measuring the one-way-phase velocity of a microwave signal

Hartwig W. Thim*, *Life Senior Member, IEEE*
Microelectronics Institute, Johannes Kepler University,
Altenbergerstrasse 69, A – 4040 Linz, Austria, and
Norbert Feist,
Leo-Fall-Strasse 26, D-86368 Gersthofen

***Abstract* –** The Michelson-Morley null result is readily explained as a classical Doppler effect [1][2][3] due to the fact that the out-and-back phase velocity is isotropic and thus in both arms of the Michelson Interferometer equal to $c'=c(1-v^2/c^2)$. It is important to emphasize that the phase velocities rather than the group velocities must be considered which are different from each other in the transverse arm whereas they are identical in the longitudinal arm. This means that the Michelson Interferometer is - in principle – unsuited to detect an absolute frame of reference or ether-drift even if an ether drift exists.

In order to reliably detect an absolute frame of reference where the speed of light is isotropic and equal to $1/\sqrt{\varepsilon_o \mu_o}$ an experimental setup allowing to measure the one-way-phase velocity of an electromagnetic wave must be used. In this presentation a microwave setup will be described which uses a 12,5 GHz signal traveling along a 3m long signal path. Both generator and detector (oscilloscope) are synchronized by a specially designed 3m long "microelectromechanical" transmission line providing a non-electromagnetic and thus "ether-independent" signal path. This setup should be capable of detecting the absolute velocity of our solar system relative to the Cosmic Microwave Background (~360km/s) by simply changing the orientation of the signal path relative to the direction of the absolute velocity in a similar manner as Marinov [4] had done it already in 1975. However, Marinov's findings (v = 303±20 km/s) have not found widespread acceptance possibly because of insufficient accuracy. The experimental setup described here is based on a straight forward and much simpler method for testing the constancy of the speed of light and, hence, special relativity. Experimental results obtained with this setup will be presented at the conference.

References

[1] W. Voigt, "Theorie des Lichtes für bewegte Medien", Königliche Gesellschaft der Wissenschaften zu Göttingen, No 8, May 11, 1887 (Sitzung am 10. Juli 1986)
[2] N. Feist, http://www.norbertfeist.de
[3] J. P. Wesley, „The two velocities of classical waves", accepted by Physics Essays 2005
[4] S. Marinov, „Measurement of the Laboratory's Absolute Velocity", General Relativity and Gravitation, vol. 12, No. 1, pp. 57-66, (1980)

*hartwig.thim@jku.at, http://www.ime.jku.at