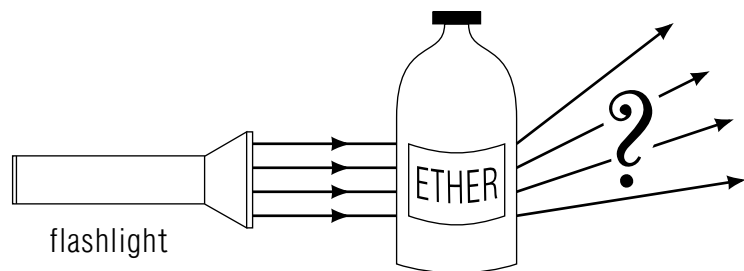


SPECIAL RELATIVITY:
THE MICHELSON-MORLEY Experiment



SPECIAL RELATIVITY: THE MICHELSON-MORLEY Experiment
by
Frank Zerilli

1. Study Guide 1
Acknowledgments.....1

Title: **Special Relativity: The Michelson-Morley Experiment**

Author: Frank J. Zerilli, Michigan State University

Version: 2/1/2000

Evaluation: Stage B1

Length: 1 hr; 8 pages

Input Skills:

1. Solve simple problems involving relative motion, using the Galilean transformation (MISN-0-11).
2. Expand a function around a point using Taylor's series (MISN-0-4).

Output Skills (Knowledge):

- K1. State the two postulates upon which special relativity is based.
- K2. Derive the Michelson-Morley fringe shift in terms of the velocity of the earth with respect to a presumed ether.
- K3. State how the results of the Michelson-Morley experiment help to justify one of the postulates of special relativity.

External Resources (Required):

1. R.T. Weidner and R.L. Sells, *Elementary Modern Physics*, Allyn and Bacon, Boston (1980). For availability, see this module's *Local Guide*.

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Our publications are designed: (i) to be updated quickly in response to field tests and new scientific developments; (ii) to be used in both classroom and professional settings; (iii) to show the prerequisite dependencies existing among the various chunks of physics knowledge and skill, as a guide both to mental organization and to use of the materials; and (iv) to be adapted quickly to specific user needs ranging from single-skill instruction to complete custom textbooks.

New authors, reviewers and field testers are welcome.

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1. Study Guide

Unless otherwise stated, the references below are to WSM¹

- Study Sections 2-1 and the first paragraph of Section 2-5 for Output Skill K1.
- Sections 2-2 and 2-3 are also helpful in understanding the significance of the first postulate of special relativity.
- Study Section 2-4 and Appendix I for Output Skills K2 and K3. For another description of the Michelson-Morley experiment (Skill K2), this reference may be helpful: A. Beiser, *Perspectives of Modern Physics*, McGraw-Hill (1969) (see this module's Local Guide for details on obtaining this reference), Section 1.1 on the Michelson-Morley experiment.
- For an interesting brief biography of one of the first great American experimental physicist, Albert Michelson, and a reprint of the original paper describing the Michelson-Morley experiment, read this excerpt: "Albert Abraham Michelson" from *Selected Papers of Great American Physicists*, ed. by S. . Weart (American Institute of Physics: New York, 1976), pp.63 - 80 (see this module's Local Guide for details on obtaining this reference).

Acknowledgments

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¹R. Weidner and R. Sells, *Elementary Modern Physics*, 3rd Edition, Allyn and Bacon (1980). For availability, see this module's *Local Guide*.

LOCAL GUIDE

The readings for this unit are on reserve for you in the Physics-Astronomy Library, Room 230 in the Physics-Astronomy Building. Ask for them as "The readings for CBI Unit 73." Do **not** ask for them by book title.

