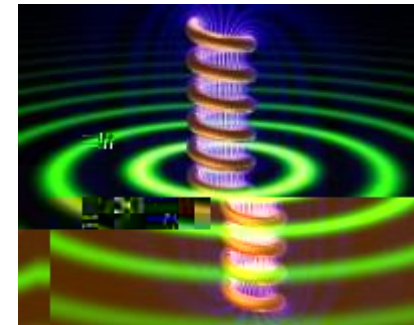


Electromagnetism: Paradoxes

Instructor

Herman Batelaan

Email: hbatelaan2@unl.edu



Description

Deep comprehension of electromagnetism is important for further studies in quantum mechanics, field theory and optics. Nevertheless, electromagnetism by itself is often presented as a technique to be mastered without much intrinsic interest. We will revisit classical electromagnetism by identifying interesting problems and studying paradoxes. Perhaps surprisingly, there are some open problems in this classical field of physics. Why have we not been able to observe the effect of gravity on electromagnetism in the laboratory? What is the resolution of the Aharonov-Bohm effect? These questions will be addressed in this lecture series. It is assumed that the student will have had an undergraduate level course in electromagnetism. The basic level electromagnetism required for the comprehension of the paradoxes will be reviewed each day before introducing the paradox.

Tentative lecture schedule (subject to change)

DATES	Timing	location	READING	TOPICS
6/25	3:30-6:30pm	B245	Griffiths Section 2.4	Electromagnetic field energy
6/26	3:30--6:30pm	B245	Griffiths, pp. 355-358; Feynman Lectures of Physics, Vol. II. pp. 26-2-26-5; (2009) 39: 295-306	Electromagnetic field energy

6/27	3:30-- 6:30pm	B245	Griffiths, pp.371-373) D U D G D \ ¶ V 3 D U D G R [
6/28	3:30-- 6:30pm	B245	Am. J. of Phys. 55, 420, (1987)	Current-carrying wire paradox.
6/29	3:30-- 6:30pm	B245	Am. J. Phys. 54, 500 (1986);	\$ K D U R Q R Y ¶ V S D U D G R [D Q G F O
7/02	3:30-- 6:30pm	B245	To be announced	Electrostatics in gravity and curved space
7/03	3:30-- 6:30pm	B245	To be announced	Slow Light and Fast Light
7/04	3:30-- 6:30pm	B245	To be announced	Monopoles and Dirac strings
7/05	3:30-- 6:30pm	B245	To be announced	Momentum in a medium, Uniformly accelerating charges, self-fields
7/06	3:30-- 6:30pm	B245	To be announced	Poisson Eq. and an application

报告人简介:

Prof. Herman Batelaan

Appointments

Professeur de première classe

2013 June 15-July 15, University of Toulouse, France.

Full Professor

2010-present, University of Nebraska Lincoln, Lincoln NE.

Visiting Professor

2005 Sept-Nov, University of Innsbruck

Associate Professor(with tenure)

2003-2010, University of Nebraska Lincoln, Lincoln NE.

Assistant Professor

1999-2003, University of Nebraska Lincoln, Lincoln NE.

Professional Preparation

Research Associate	1998-1999, Atomic and Optical Interactions group, Technical University of Eindhoven, The Netherlands.
Research Assistant Professor, Lecturer	1996-1998, Atomic physics group, University of NebraskaLincoln.
Lise Meitner fellow	1994-1996, Institut für Experimental Physik, University of Innsbruck, Austria.
Post-doctoral fellow	1991-1994, Quantum electronics group, SUNY at Stony Brook NY.
Graduate Institution	1987-1991, Physics, Ph. D., Atomic physics group, University of Utrecht, The Netherlands.
Undergraduate Institution	1983-1987, Physics, Masters, University of Leiden, The Netherlands.

Publications (selected)

1. **The Aharonov Bohm effects: Variations on a subtle theme**, H. Batelaan and A. Tonomura, **Phys. Today 62 September 38 (2009)**
2. **Macroscopic Test of the Aharonov-Bohm Effect**. A. Caprez, B. Barwick, and H. Batelaan, *Phys. Rev. Lett.* 99, 210401 (2007)
3. **S. Hilbert, B. Barwick, C. J. G. J. Uiterwaal, H. Batelaan, A. Zewail, "Temporal lenses for attosecond and femtosecond electron pulses"**, *PNAS*, p. 10558, vol. 106, (2009).
4. **Tip-top imaging**. H. Batelaan and C. J. G. J. Uiterwaal, *Nature* 446, 500 (2007).
5. *Colloquium: Illuminating the Kapitza-Dirac effect with electron matter optics*. H. Batelaan. *Rev. of Mod. Phys.* 79, 929 (2007)