

Education, Human Resources, and Outreach

◆ Director - Christine Morrow

- Director since 1998
- MA in Teaching
 - » science education & assessment
- 5 years classroom teaching experience
- 10 years science outreach experience
 - » CU Science Discovery
- Member
 - » Denver Area Physics Teachers Association
 - » Colorado Science Teachers Conference
 - » National Science Teachers Association
 - » NRCEN: NSF's Research Centers Educators Network
 - » Materials Research Society
 - » Association for Curriculum Development

◆ EHRO Committee

- Associate Director
- 2 Senior Investigators
- 2 Graduate Students
- 2 Research Associates
- Director, CU Science Outreach
- High School Science Teacher



Tom Furtak with K-12
teachers in
“How Things Work”



Enhancement of Science Literacy & Achievement

- ◆ ***Offer innovative, experiential opportunities and programs***

“inspirational education”

- ◆ ***Increase participation of underrepresented groups***
- ◆ ***Improve understanding and communication of science through experiences with diverse audiences***
- ◆ ***Train students to work in an interdisciplinary environment***



Education Programs for K-12 and the General Public

- ◆ **Materials Science From CU Classroom Programs**
 - Targeting K-12 school populations with 50% Title I status
 - MESA School Sites (Math, Engineering, and Science Achievement)
- ◆ **Materials Science From CU Traveling Kits**
- ◆ **Wizards Show (Light, Polarization, and Liquid Crystals)**
- ◆ **High School Honors Institute**
- ◆ **Science Fair Judging**
- ◆ **Lab Tours**
- ◆ **Physics 2000 website (Liquid crystal displays)**
- ◆ **Newsletter (The Liquid Crystal Observer)**
- ◆ **Website (<http://flcmrc.colorado.edu>)**

- ◆ **Professional Development Opportunities for Teachers**
- ◆ **Research Experience for Teachers (RET)**
- ◆ **Goals 2000 - Statewide CO DOE Teachers Enhancement Program**
- ◆ **Colorado Science Teachers Conference (CSC)**
- ◆ **Lab Tours**



At-risk HS students visiting the Walba lab



Materials Science From CU

- ◆ **Uses materials as a context to teach physical science**
- ◆ **Science enrichment classes and workshops for K-12**
 - **Meets the demand for grades 5-12 physical science content**
 - **Enhances Existing Classroom Studies**
 - **Each class on a specific topic**
 - **Center members travel to schools**
 - » **CU trained & equipped**
 - **Accompanying Teaching Modules**
 - » **Extension lesson plans & activities**
 - **Supports State and National Science Standards**



Center Members Teaching at Schools



K-12 Program Development Process EHRO Committee

◆ *Material Science From CU*

- *Selects topic***
- *Organizes development team***
 - » *Senior Investigator, EHRO Director, graduate students, Center Staff K-12 teacher, technical support staff and fabricators***

◆ *Professional Development Opportunities for Teachers*

- *Short Courses***
- *Colorado Science Teachers Conference (CSC)***
- *Research Experience for Teachers (RET)***
- *Goals 2000 - Statewide CO DOE Teachers Enhancement Program***
 - » *Recruit Faculty***
 - ◆ *Faculty Interest***
 - ◆ *FCQ's - Faculty Course Questionnaire***
 - ◆ *Distribute the responsibilities among Senior Investigators***

Senior investigator



Tapping into Support Services

- ◆ **At your Center**

- **Center members**

- » *Senior investigators, junior faculty, graduate and undergraduate students, research assistants, technicians*

- ◆ **At your Institution**

- **Department**

- » *Machine and precision shops*
 - » *Administrative support*
 - » *Student Clubs - Biochemistry-Chemistry Club*
 - » *Partnering with School of Education*

- ◆ **Science Discovery**

- *Science From CU*

- » **University-wide programs**

- ◆ *CU Wizards, Office of Community Affairs, CU Museum, CU Foundation*

- ◆ **Community**

- **Local**

- » *Museums, school districts, libraries, science clubs*

- **State and National**

- » **Teacher professional development**

- Colorado Association of Science Educators, Colorado Science Educators Network, Colorado Commission of Higher Education, National Science Teacher Association, Grantmakers/Foundations*



Chemistry Club undergraduates give a presentation to teachers at CSC



The CU Wizards Shows-26 Years Strong

◆ University-Wide Outreach Program

- » Science entertainment aimed at grades 5-9
- » Informal & interactive
- » Monthly hour-long shows during the AY
- » Road shows throughout Colorado



The University of Colorado at Boulder presents:

CU WIZARDS!

FREE!

WHAT
The 26th annual CU WIZARDS program is an informal introduction to astronomy, chemistry and physics, intended primarily for students in grades 5 through 9. Each program will last about an hour and will include several lively demonstration experiments.

WHERE
Come to the University of Colorado at Boulder. See below for specific building and room. There is FREE PARKING ONLY in LOTS 855, 899, 306, 376, 396, and 436.* There is also parking available for a nominal fee in the Student parking structure. Please refer to the map on the reverse side of this sheet. Certain parking spaces are reserved for parent's holders at all times. Do not park in these spaces or you will be towed.

NO RESERVATIONS REQUIRED!

EVERYONE WELCOME!

2000-2001 PROGRAM SCHEDULE
Shows are usually the last Saturday of each month, September through June. All shows begin at 9:30 a.m.
* Please note that the June 16th show will be given twice, one at 9:30 a.m. and one at 11:30 a.m.

* September 28	FUN WITH MOLECULES!	Professor David North	Chemistry 140
* October 28	BIOLOGY OF MUSCLES IN MOTION	Professors Todd Glisson and Mark Chodura	Chemistry 140
November 23	CHEMISTRY IN THE KITCHEN	Professor Janet Dugdale	Chemistry 140
December 30	LIQUID CRYSTALS	Professors Neil Clark, Dave Walker, Joe MacInneson	Duane Physics G1836
January 27	HOT AND COLD	Professor John Taylor	Duane Physics G1836
February 24	BIOCHEMISTRY FOR KIDS	Professor Debbie Wotke	Chemistry 140
March 21	THE PHYSICS OF MUSIC	Professor James Fuller	Duane Physics G1836
April 28	FIREFLIES, DIAPERS AND EXPLODING HYDROGEN BALLETTONS; CHEMISTRY IN ACTION	Professor Terek Samokis	Chemistry 140
May 26	BOOM! THE PHYSICS OF SOUND AND AIR PRESSURE	Professor Michael Dubson	Duane Physics G-1800
June 16	BLACK HOLES	Professor Andrew Haworth	Fiske Planetarium

* Lots 855, 899, and 8436 only. Free parking lots these two days due to the CU football game.

Science is Fun!

SPECIAL ACCOMMODATIONS
If you have a special need or disability, please notify the Physics Office, 492-6812, a few days in advance of the show you will be attending. Free wheelchair access to Duane Physics is through the east door.

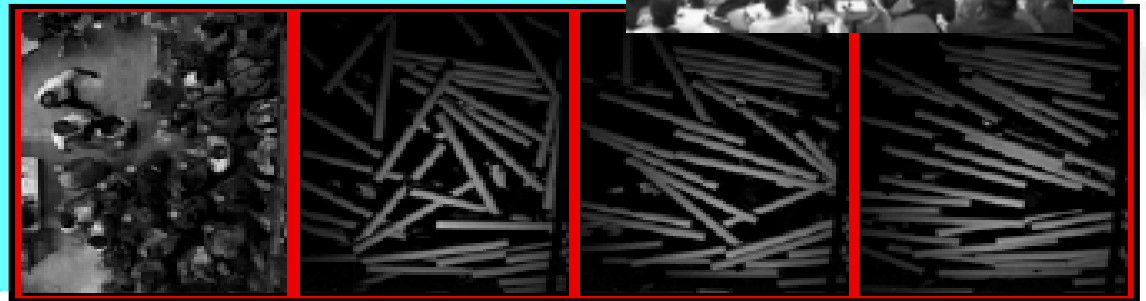


Liquid Crystal Wizards Show (“Light, Polarization, and Liquid Crystals”)

◆ Recent Shows

- Halloween, 1998 (CU, 350)
- January, 1999 (Montrose, 600)
- March, 2000 (CU, 350)
- December, 2000 (CU, 400)
- October, 2001 (CU, 120)
- February, 2002 (CU, 400)

Wizard’s magic
turn parents
into molecules!

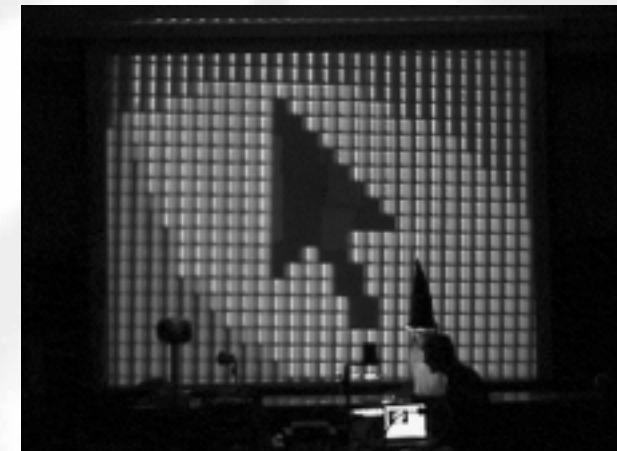


◆ Show Features

- The parents are the molecules
- Attack of the giant cursor
- Optics kit and experiments to do at home

◆ A Center-Wide Effort

- Graduate students, staff,
and faculty play key roles



Attack of the Giant Cursor



K-12 Teacher Professional Development Opportunities

- ◆ **Research Experience Opportunities for Teachers (RET)**
 - NSF Funded - 14 teachers over the past three years
 - Collaboration with Center scientists
 - Teaching module based upon research
 - Teachers: a uniquely valuable career event (Jack's letter)
 - » Summer 2002: 63 applications for 8 fellowships
- ◆ **Goals 2000 - Colorado Science Assessment Initiative**
 - Week-long, in depth science content
 - Focused on standards-based classroom teaching
- ◆ **“How Things Work” Teacher Enhancement Short Course**
 - Senior Investigators
 - High school science teachers
 - Uses gadgets and materials from everyday life
- ◆ **Lab Tours**



**Jack Fish: “RET
a uniquely valuable
career event”**



Physics 2000

- ◆ Department of Physics Educational website
Liquid Crystal module: How does a display work?

Physics 2000 - Netscape

File Edit View Go Communicator Help

Back Forward Reload Home Search Netscape Print Security Shop Stop

Bookmarks Location: <http://www.Colorado.EDU/physics/2000/index.pl> What's Related

Instant Message Internet Lookup NewtCool RealPlayer

NO FRAMES INFO
MAKE BOOKMARKS INFO

Physics 2000
What is it?
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Einstein's Legacy
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Physics 2000
A University of Colorado at Boulder Website

Proud Winner of a
Pirelli
INTERNATIONAL
Award!

Welcome to Physics 2000, an interactive journey through modern physics!
Have fun learning visually and conceptually about 20th Century science and
high-tech devices.

2000 Einstein's Legacy Laptop Screens

Liquid Crystals

I'll begin at the beginning, by explaining just what a liquid crystal is: it's a substance that behaves something like a liquid and something like a solid. If you were to touch the stuff, it would feel gooey and soapy—in fact, the dirty mess you find at the bottom of a soap dish is a genuine liquid crystal, not much different from the material in a laptop screen.

What is it?

What makes a liquid crystal different from ordinary liquids is the shape of its molecules: they're long and thin, like french fries. Even if the molecules' positions are random, their orientations can be aligned with one another in a regular pattern—and that's what creates the ordered structure of a liquid crystal.

Calculator Displays

I'm still trying to make sure I have all this light-dark, on-off stuff straight. Signal on means dark... so the numbers in a calculator display must be places where the electric field is turned on.

That's right. Take a look at this next applet; it's a model of a calculator display. Selecting "outside" shows you the display itself, select "inside" to see the electrodes and liquid crystal molecules underneath.

Images loaded.



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Enhancement of Science Literacy & Achievement

