



<http://www.magnet.fsu.edu/education/teachers/resources/supernet/index.html>



SuperNet scientists and teachers brainstorm lesson ideas.

- An educational network connecting scientists and teachers
- Explore the **emergent universe** through inquiry-based activities.

### **Mentoring & Outreach**

- Teachers work alongside leading scientists throughout the year.
- From cutting-edge research to the classrooms
- Continuing professional teacher development

*SuperNet is an educational outreach project of the **Institute for Complex Adaptive Matter (ICAM)**, with its home at the **National High Magnetic Field Laboratory** at Florida State University*



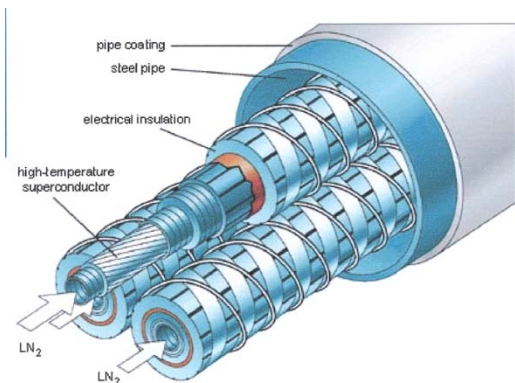
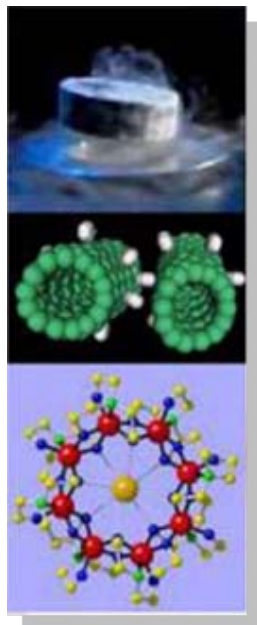


## Materials Development

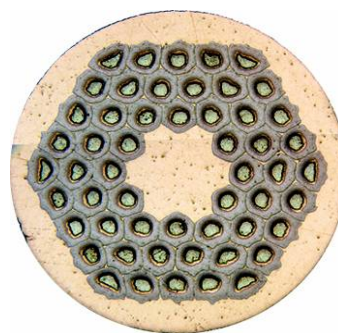
Development of materials for **teaching high school students** through participation in inquiry-oriented investigations and web-based data analysis through on-going teacher professional development.

### Topics

- **Initially:** from superconductivity, electricity and magnetism,...
- **Later:** depth in sets of topics within **condensed matter physics**  
FT-ICR for proteomics  
Probe currents for  $T_C$  of “new” materials
- **Long term:** topics relating to **emergent behavior** in matter and society.



The cross-section of a three-core HTS cable showing the liquid-nitrogen ( $LN_2$ ) ducts along the core of each cable, and the spirally wound high-temperature superconductor tapes.



**$Nb_3Sn$  filaments  
in Cu**





## Modules for Teachers

A main focus of SuperNet is the development of modules created through collaboration among faculty at partner institutions, teachers and students.

### Current and planned modules include:

- **Superconductivity web-based *Treasure Hunt***
- ***Meissner Effect* demonstration , *Expanded Script* @ *July 07 AAPT***
- *Thermal energy, temperature, and heat transfer*
- ***Phase transitions: phenomena at temp. “scalings”***
- *Structure: From carbon to **carbon nanotubes***
- ***Conductivity* of materials: metals, insulators, superconductors**
- *Quantum mechanics: 2 slit experiments to **qubits**; tunneling*
- ***Application of FT-ICR proteomics in biology classes***
- ***Web-based data sets to explore TC with probe currents***



Superconductivity – an example of emergent behavior – can be explained by demonstrating the Meissner Effect.

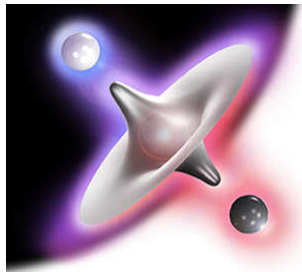
# Why SC? Why This Demo?



Peering into the body without cutting it open

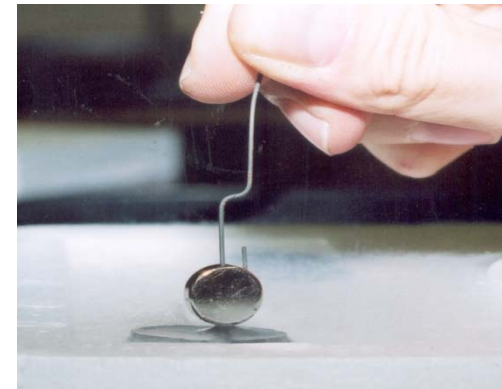


Traveling hundreds of miles per hour in a levitated train



Steering antimatter moving at the speed of light

Expansions/Extensions



# Teacher Workshops

- MagLab Workshop I: Held January 30, 2007
- MagLab Workshop II: Held May 1, 2007
- MagLab Workshop III: TBA, January 23, 2008
- These workshops have drawn **fifteen teachers** from **nine area middle schools** and **high schools**.



Teachers at a SuperNet workshop

- Presentations by Magnet Lab Scientists (can be downloaded from the SuperNet Web page)
- Metals, Magnetic Fields and Superconductors, Nick Bonesteel
- Superconductivity: From Physics to the Applications, David Larbalestier
- The Science of High Magnetic Fields, Chris Wiebe
- Electricity and Magnetism, from Early History to the Latest Research **Greg Boebinger**



Andre-Marie Ampere



# Pilot Phase: Principal Participants



## Florida State University (Magnet Lab: “The Hub”)

**Vladimir Dobrosavljevic** – Scientist  
**Pat Dixon** – Outreach (NHMFL/CIRL)  
**Brian McClain** – Lead Teacher  
**Nick Bonesteel** - Scientist  
**Chris Wiebe** - Scientist  
**Irinel Chiorescu** – Scientist  
**Greg Boebinger** – Guest Speaker



**Pat Dixon -Director**  
(MagLab Outreach Center)



A teacher searches for a kernel of truth in his project on irradiated popcorn.

## FermiLab and Illinios

**Marge Bardeen** - Outreach  
**Jeff Rylander** – Lead Teacher  
**Phil Sumida** – Lead Teacher  
**James Carrubba** –Teaching Assistant

## Ohio State University

**Nandini Trivedi** – Scientist  
**Mindy Wright** – Outreach  
Lead Teacher  
**Andrew Heckler** - Scientist  
**Tom Lemberger** - Scientist  
**Bruce Patton** - Scientist



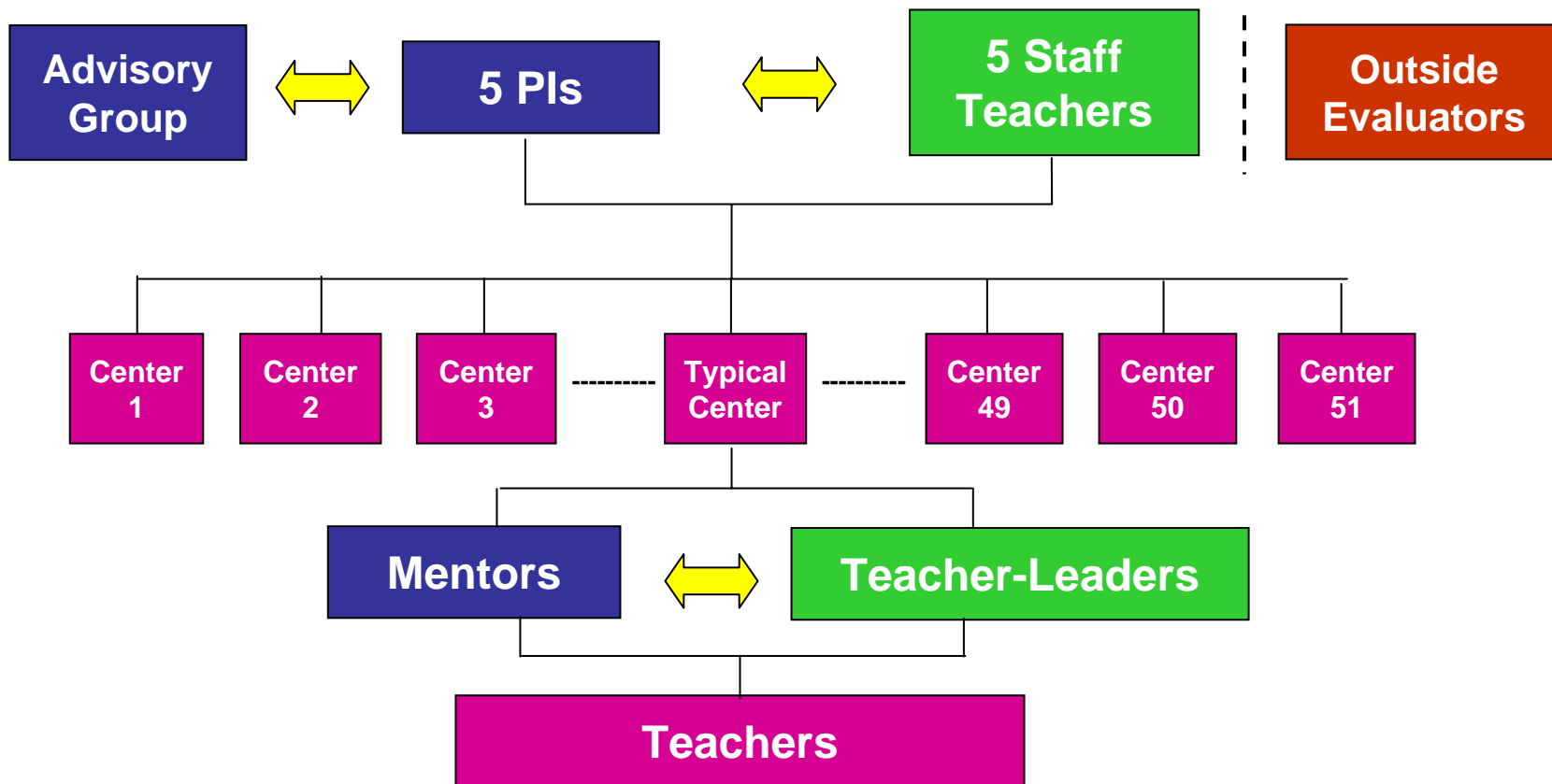
What floats your squash? Teachers examine the mysteries of mass, density and veggies.

# SuperNet Management Vision:

*Inspired by QuarkNet*



## Management Chart



# Thank You 😊



If you would like to discuss and maybe “sponsor” a *SuperNet* node at your institution, you can:

- See me, Brian McClain; or
- Check the Education link of the NHMFL; or
- Email [vlad@magnet.fsu.edu](mailto:vlad@magnet.fsu.edu)
- *Google* us at: supernet superconductivity