APS Outreach

How to Bring New Users and New Science to the APS

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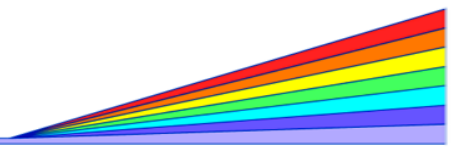
The “Problem”:

Currently the APS has ~5000 users. Projected to grow to ~10,000 users in the next 10 years. NSLS, SSRL, CHESS, etc. all have large active user programs that will continue into the foreseeable future.

Where do we find enough new users with high quality science?



"Solutions":

Recruitment of experienced users by beamline staff (poaching from other sources)

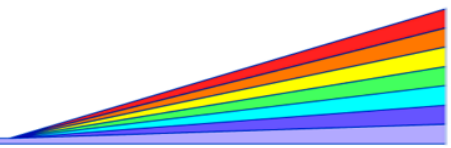
Growth in programs of current users

Opening new experimental capabilities

Satisfying current oversubscription

Outreach to scientists who could, but currently do not use synchrotrons

- Traditional users
- Non-traditional users



Recruiting New Users to Synchrotrons

Approaches:

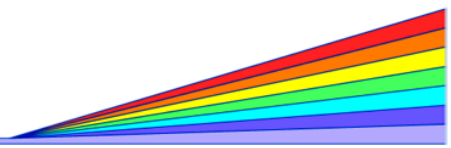
- Visiting scientists
- Resident students
  - Graduate students pursuing PhDs
- Short-term, focused graduate student training
  - N/X School
- Focused technique/subject workshops
  - Graduate students, postdocs, established scientists
- Co-ops, summer students, interns
  - Also has strong publicity aspect
  - XCITE

Visiting Scientists

- Key point is developing personal relationships with beamline staff

Resident Students

- Works best with local universities
  - Northwestern, U. of Illinois, NIU, Purdue, Iowa State
- Develops strong, lasting relationships with the student's university advisor
- Students often are liaisons to other students back at home institution
- These students are likely to remain active users post-graduation
- Staff benefit from a strong academic interest in the student's project



Short-term, Focused Graduate Student Training

National School on Neutron and X-ray Scattering

Motivations:

- Perceived need to train the next generation of users for x-ray and neutron facilities.
- Success of the ESRF/ILL Hercules program

Gopal Shenoy, Bruce Brown (IPNS), Gian Felcher (MSD), Harold Myron (DEP) led the initial efforts.

Funded by DOE-BES (Iran Thomas) (~$100K)

1st school in August 1999 (45 students)

Scope:

Condensed Matter Physics Materials Science

Chemistry

Biology (not PX)

Geology, etc.

Dennis Mills and Gian Felcher scientific directors 1999-2000

Jin Wang and Jyotsana Lal, Experimental Coordinators

Current Organization

Local Organizing Committee

Raymond Osborn and Dean Haeffner, Scientific Directors

Harold Myron, Educational Director

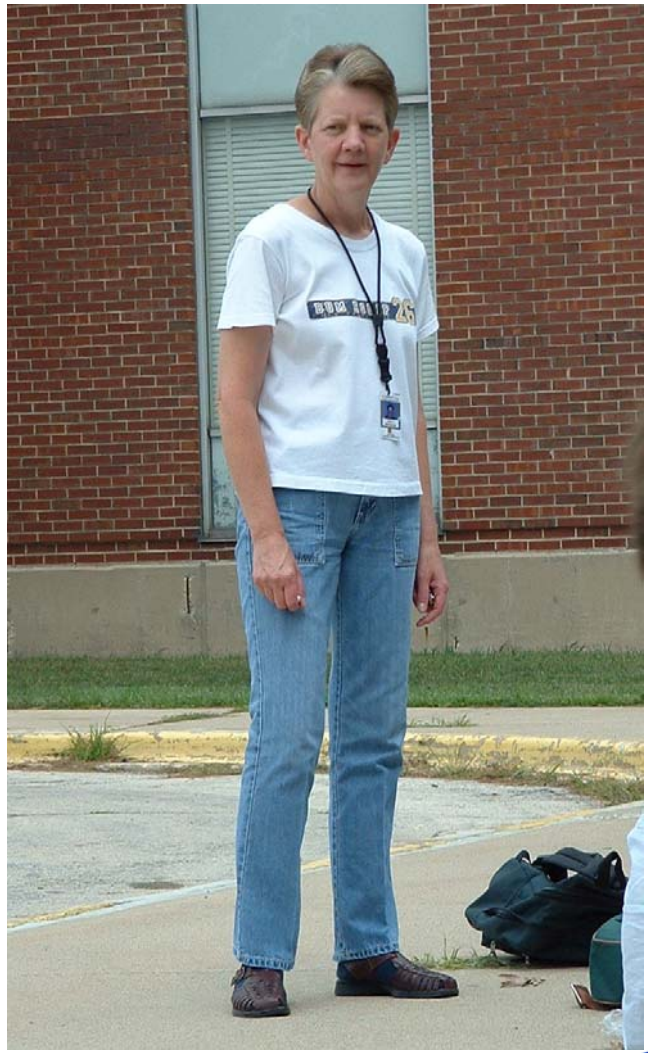
Carol Reynolds, Conference Secretary

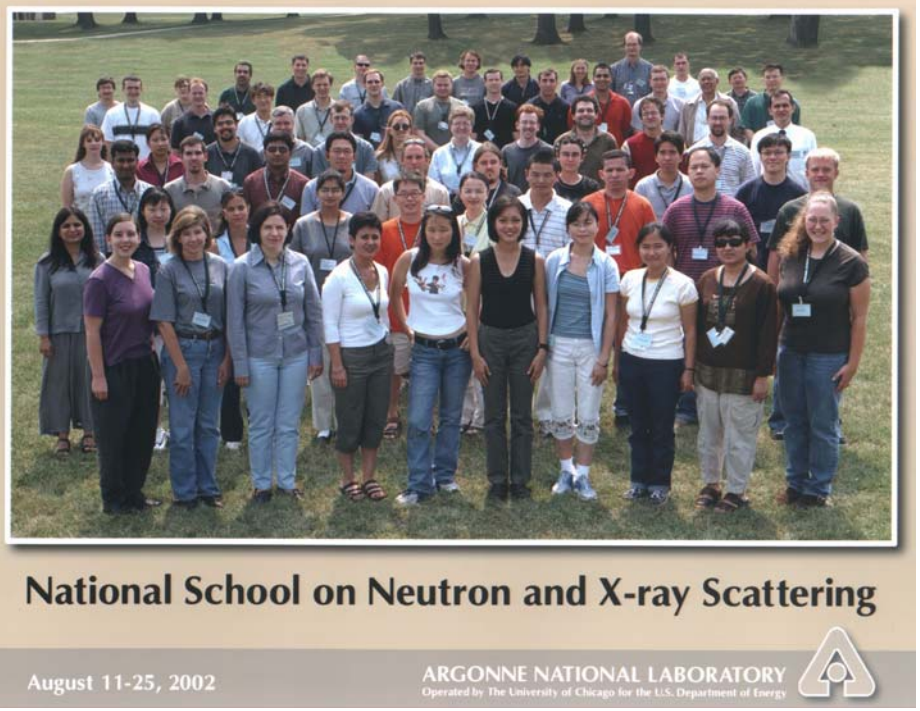
Ray Teller - IPNS

George Crabtree - MSD

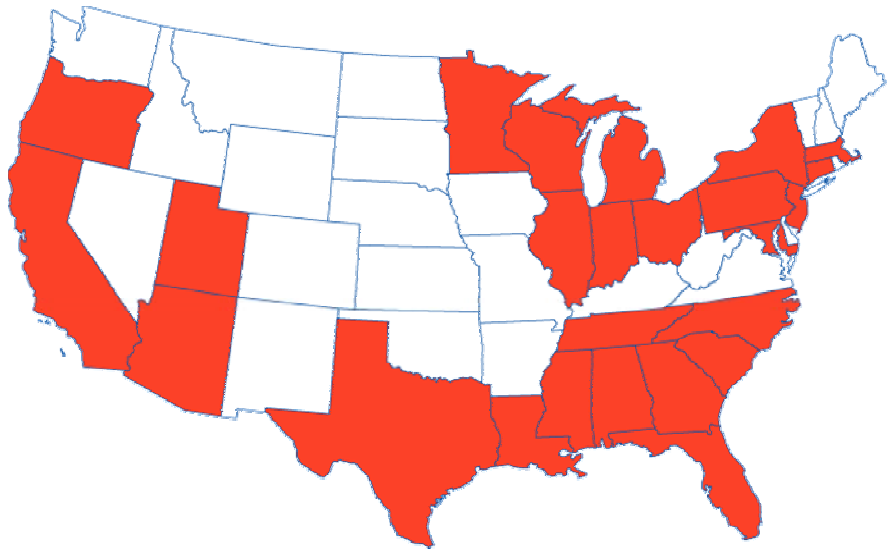
Dennis Mills - APS

Jonathan Lang and Chris Benmore, Experimental Coordinators





- Held every August at ANL
- 60 students from U.S. Graduate Schools
- Lecturers from Universities, National Labs, and Industry
- Experiments at the APS and IPNS



2001 ➜ 179 applicants

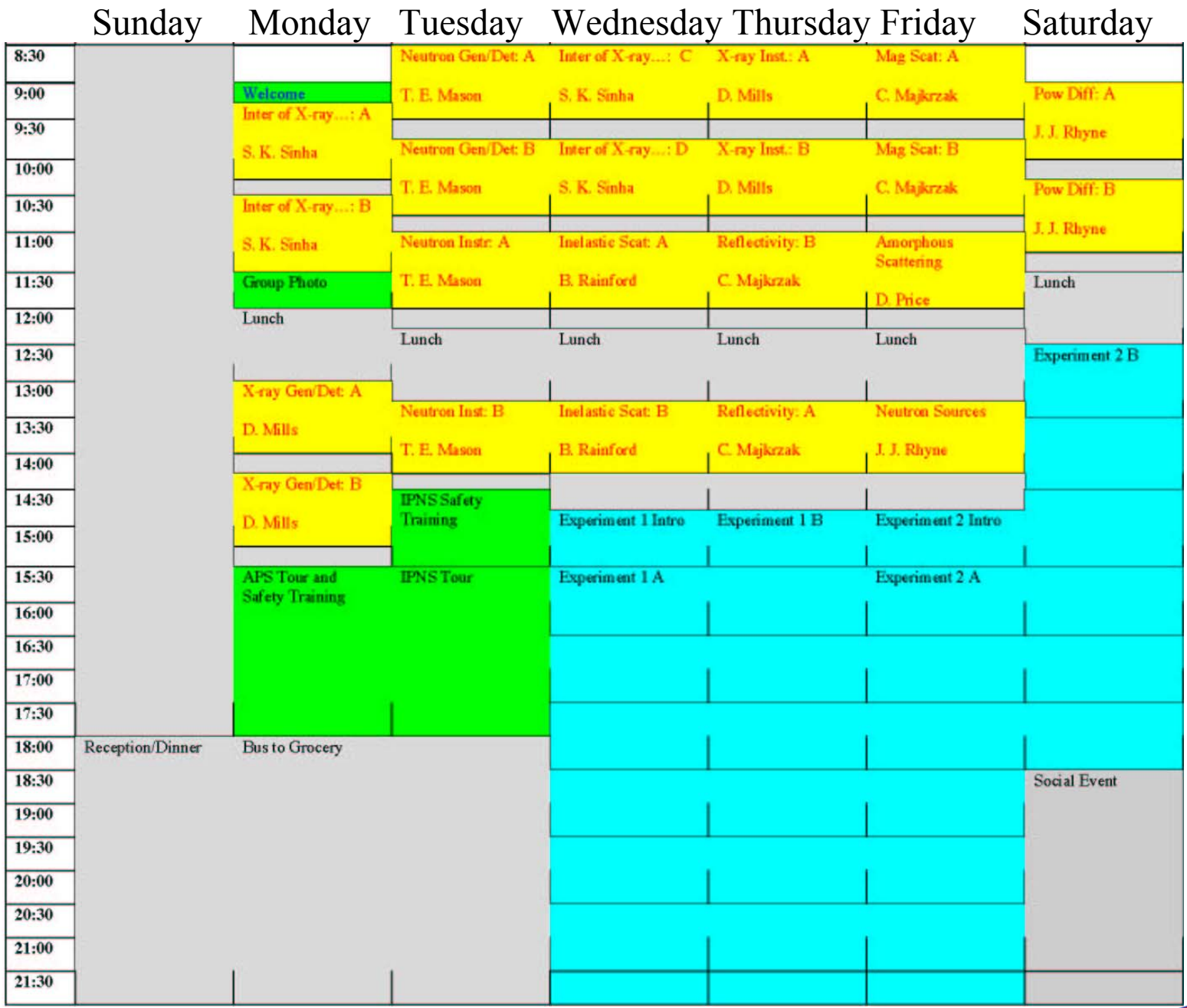
2002 ➜ 121 applicants

2003 ➜ 142 applicants

In 2002:

24 States (Illinois-12)

41 Universities (U. of Illinois UC-4, U. Mass-4)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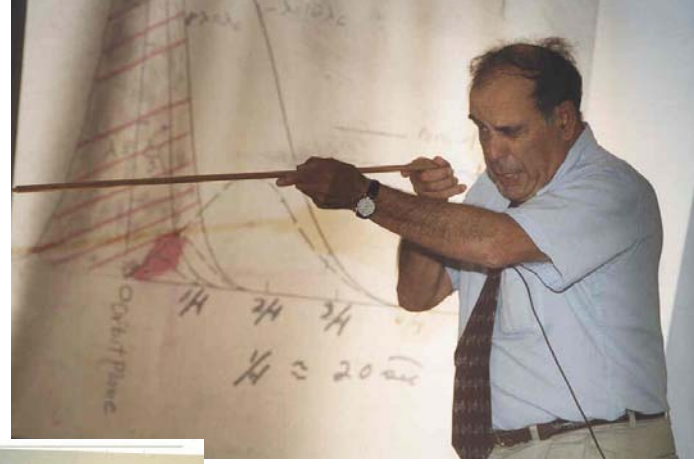
Welcome
Inter of X-ray...: A
S. K. Sinha
Inter of X-ray...: B
S. K. Sinha
Group Photo
Lunch
X-ray Gen/Det: A
D. Mills
X-ray Gen/Det: B
D. Mills
APS Tour and Safety Training
Reception/Dinner
Bus to Grocery
Neutron Gen/Det: A
T. E. Mason
Neutron Gen/Det: B
T. E. Mason
Neutron Instr: A
T. E. Mason
Lunch
Neutron Inst: B
T. E. Mason
IPNS Safety Training
IPNS Tour
Inter of X-ray...: C
S. K. Sinha
Inter of X-ray...: D
S. K. Sinha
Inelastic Scat: A
B. Rainford
Lunch
Inelastic Scat: B
B. Rainford
Experiment 1 Intro
Experiment 1 A
X-ray Inst.: A
D. Mills
X-ray Inst.: B
D. Mills
Reflectivity: B
C. Majkrzak
Lunch
Reflectivity: A
C. Majkrzak
Experiment 1 B
Mag Scat: A
C. Majkrzak
Mag Scat: B
C. Majkrzak
Amorphous Scattering
D. Price
Lunch
Neutron Sources
J. J. Rhyne
Experiment 2 Intro
Experiment 2 A
Pow Diff: A
J. J. Rhyne
Pow Diff: B
J. J. Rhyne
Lunch
Experiment 2 B
Social Event

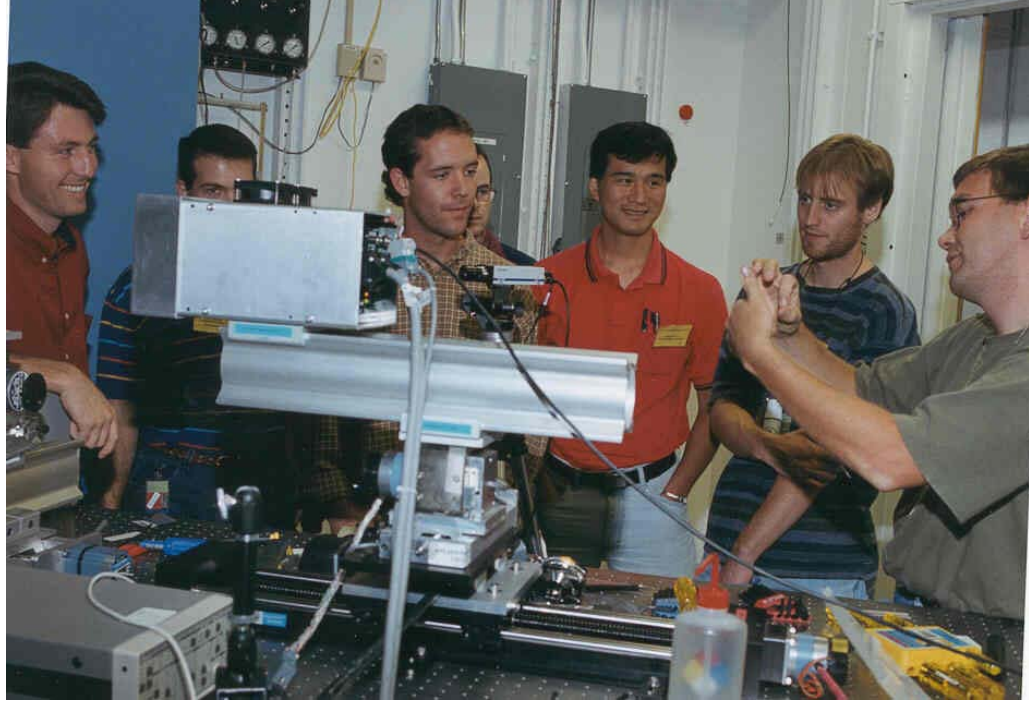
Lectures

- Interactions of X-rays and Neutrons with Matter
- Neutron Generation and Detection
- Neutron Instrumentation
- X-ray Generation and Detection
- X-ray Instrumentation
- Single-Crystal and Surface Diffraction
- Powder Diffraction
- Inelastic Scattering
- Reflectivity
- Magnetic Scattering
- EXAFS
- Small Angle Scattering
- Diffuse Scattering
- Nuclear Resonant Inelastic X-ray Scattering
- Coherent X-ray Scattering
- Amorphous Scattering



Experiments

- Powder Diffraction
- Small Angle Scattering
- Reflectivity
- Inelastic Scattering
- Quasi-elastic neutron scattering
- Liquids and Amorphous Scattering
- Stress/Strain/Texture
- Reflectivity
- EXAFS
- Single Crystal Diffraction
- Magnetic Dichroism
- Coherent X-ray Scattering
- X-ray Microprobe



12 groups of 5 students
Each group does 2 APS experiments, 2 IPNS experiments.
Total of 12 APS experiments, 6 IPNS experiments
Presentations on last day of school

2002 APS Beamlines:

XOR 1-ID (2)

XOR 1-BM (2)

XOR 3-ID

XOR 4-ID

DND-CAT

PNC-CAT

UNI-CAT

GSECARS-CAT

ChemMatCARS-CAT

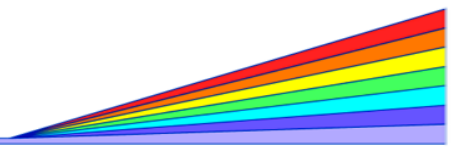
IMM-CAT

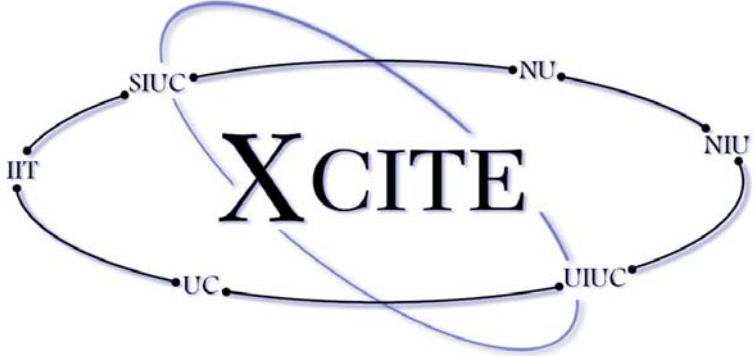
Social Events

Barbeque
Trip to Chicago
Banquet

Focused Technique/Subject Workshops

- Still in the planning stage
  - Target for 1st workshop is next spring
- Focused mainly on established scientists and postdocs, though also could include students
- Possible subjects: EXAFS, SAXS, Powder Diffraction, Inelastic Scattering, Stress/Strain/Texture
- A few days in length, focused lectures, and experiments on appropriate beamlines
- Needs strong cooperation between the APS and CATs





X-ray Collaboration for Illinois Technology and Education

- Funded by the State of Illinois
  - Outreach
  - Inter-institutional cooperation
  - Funding for research and equipment acquisition
- $24 million from in last 10 years
- Since 1999 $780,000 set aside for outreach
  - Summer internships
  - Seminars, symposia, and APS tours
  - Technical assistance in proposal preparation
  - Curriculum infusion
  - Guest Speakers
  - Development of statewide undergraduate research community

Conclusion

- Can we find enough high-quality users for the APS in mature operations (as well as for the other U.S. synchrotrons?
- My answer: Probably, but the quality of the usage will depend on outreach efforts that we put in place now.
- All of the various efforts take resources.
  - Staff time
  - Support staff
  - Direct financial aid