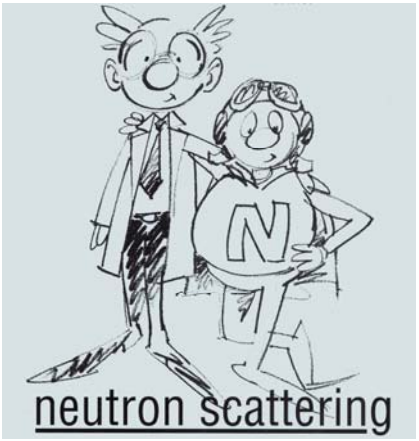
Cartoons by David Delano
Los Alamos, New Mexico



Neutron Scattering, Comic Strips and Video Games

Roger Pynn

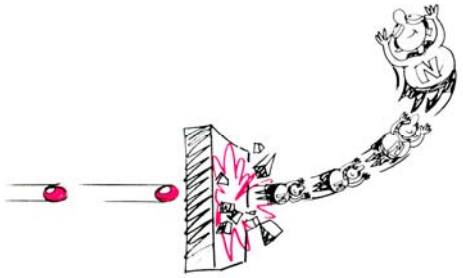
Indiana University and the Spallation Neutron Source

Main Messages

- Neutron scattering facilities can be daunting *BUT*..
- Neutron scattering isn't that "scary"
  - Facilities are set up to help new users
- There are opportunities to learn the basics
  - Neutron schools at facilities and Society meetings (eg APS)
  - On-line material
  - New initiatives are planned in neutron scattering education
- There are opportunities to collaborate on experiments
  - Through facilities, universities, NSSA and new programs (Egami)

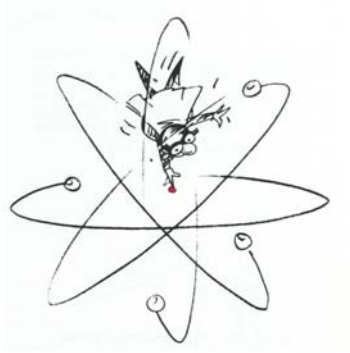
How to Get Started

- Read the “comic strip version” at www.mrl.ucsb.edu/~pynn

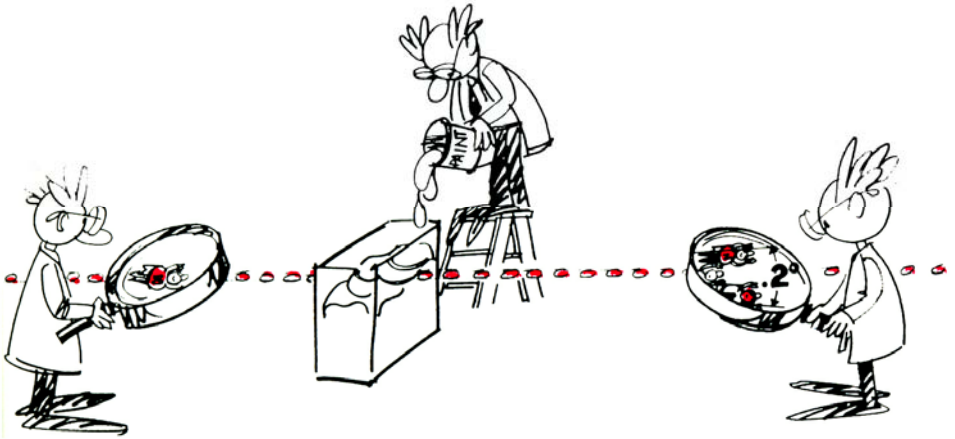


Protons hit a heavy metal producing neutrons by spallation

Neutrons are slowed down by interacting with cold H_2



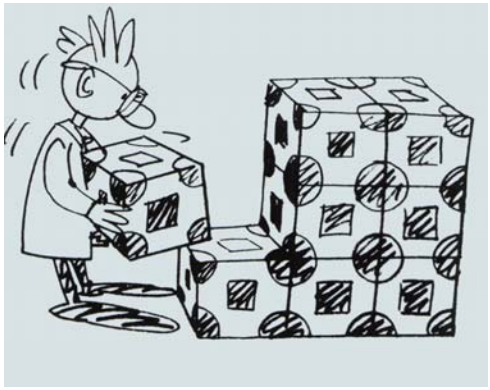
Neutrons are scattered by nuclei in matter



Scientists measure the angle through which neutrons are scattered and deduce the atomic arrangement of the sample

More Basics

At pulsed spallation sources like the SNS, the neutron speed is measured using time-of-flight



Sometimes we just determine how atoms are arranged in crystalline matter

Sometimes, atomic vibrations in materials cause the neutrons to speed up or slow down when they are scattered. This tells us how strong the “springs” are between the atoms.

We Surveyed University Members of NSSA

1. Have you or your students ever done a neutron scattering experiment?

	Response Percent	Response Count
yes	91.8%	67
no	8.2%	6
answered question		73
skipped question		0

2. If you answered "yes" to question #1 above, please select all that apply:

	Response Percent	Response Count
I am a frequent user of national neutron facilities.	51.5%	35
I am an occasional user of national neutron facilities.	38.2%	26
Neutron scattering is the primary focus of my research.	27.9%	19
Neutron scattering is supplemental to my research.	32.4%	22

Of those who told us how they got started:

- 16 started as graduate students
- 5 started as postdocs
- 9 came in as new users
- 3 started with a course at a National neutron school

There are Many Ways to Learn About Neutron Scattering

6. How did you learn about neutron scattering theory? (check all that apply)	Response Percent	Response Count
Mentoring by a professor or senior colleague	**66.7%**	48
Course(s) at your institution	25.0%	18
Course(s) at other academic institutions	1.4%	1
Short course(s) at conference or professional meeting	22.2%	16
Self-study using a textbook [if so, please specify below]	59.7%	43
On-site instruction by instrument scientist during an experiment	63.9%	46
Other [please specify below]	9.7%	7
Comment field:	view	18
	answered question	**72**
	skipped question	**1**

- Go to the web pages of NCNR, SNS/HFIR & the Lujan Center for facility courses
- Go to http://www.iub.edu/~neutron/ to download videos & lecture notes

Workshop on Neutron Scattering Education

- Lot's of good ideas emerged
  - Webcast schools/webinars
  - Database of lecture videos/podcasts
  - Database of neutron science success stories
  - Wikipedia
  - Web based lectures / tutorials – possibly interactive
  - Hands-on experience at university neutron sources
  - Data base of practical examples and insights from actual studies
  - Ask an expert web site
  - Neutron scattering video games
  - Lecture prize and speakers bureau
  - Training in writing experiment proposals
  - Social network site for neutron scattering
  - Internships
- We expect groups will seek funding