



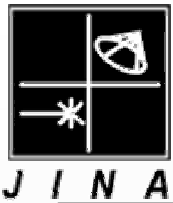
Report to JINA-Advisory Committee

March 2, 2007

Michael Wiescher

- JINA Members & Collaborations
- JINA Research Components & Initiatives
- JINA Organizational Structure
- JINA Achievements & Future Goals
- JINA Manpower & Visitors
- JINA Conferences & Schools
- JINA Web-Developments & Outreach





JINA Committees



Executive Committee

monthly phone conferences

Ani Aprahamian (Notre Dame)

Sam M. Austin (MSU)

Timothy Beers (MSU)

Adam Burrows (U. Arizona)

Karl E. Rehm (ANL)

Hendrik Schatz (MSU)

Frank Timmes (LANL)

James W. Truran (U. Chicago)

Lars Bildsten (UCSB)

International Advisory Committee

annual review meetings

Carmen Angulo (Louvain la Neuve, Belgium)

Sam M. Austin (JINA, NSCL, MSU, USA)

Ani Aprahamian (JINA, Notre Dame, NSF, USA)

Stuart Freedman (UC Berkeley, USA)

Karlheinz Langanke (TH Darmstadt, GSI, Germany)

James Lattimer (SUNY, Stony Brook, USA)

Peggy McMahan (LBNL, USA)

Ken'ichi Nomoto (U. Tokyo, Japan)

Peter Parker (Yale University, USA) - CHAIR

Verne Smith (U. Texas, NOAO, USA)

Alan Shotter (TRIUMF, Canada)

Friedrich-Karl Thielemann (U. Basel, Switzerland)

Roland Diehl (MPI Garching, Germany)

Vijay Pandharipande (U. Illinois, USA)

Chris Sneden (U. Texas, USA)

Monique Spite (Observatoire de Paris, France)

Todd Strohmeyer (Goddard, NASA, USA)

Stan Woosley (UCSC, USA)



JINA Budget

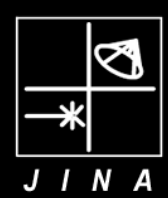
\$10M for 5 years including overhead
plus 25% from core institutions

ISNAP/U. Notre Dame	32%
CANDU/U. Notre Dame	8%
NSCL/MSU	36%
University of Chicago	14%
University of Arizona	5%
UC Santa Barbara	5%

Equipment	20%
Postdocs & Students	50%
Visitors & Conference	25%
Outreach & Education	5%

Additional Support

\$	125,000	ND for SDSS-II
\$	125,000	MSU (in kind)
\$	60,000	LANL students
\$	330,000	LANL
\$	210,000	NSF Supplement
\$	1,550,000	ND Infrastructure





JINA Members & Collaborators

Core Institutions:
(PI status)

University of Notre Dame
Michigan State University
University of Chicago

Associate Institutions:
(JINA fellow program)

Argonne National Laboratory
Los Alamos National Laboratory
Lawrence Berkeley National Laboratory

University of Arizona
(UC Santa Barbara)
(UC Santa Cruz)
Keele University, UK
Western Michigan University





JINA Affiliates & Collaborators

Affiliated Institutions (letter of understanding):

Los Alamos National Laboratory
ViSTAR (Mainz, GSI, Germany)

SDSS-II collaboration
n-ToF CERN collaboration
LUNA Gran Sasso collaboration

Collaborating US/Canada Institutions:

Arizona State University, AZ
Ball State University, IN
Hope College, MI
HRIBF, Oak Ridge Natl. Lab., TN
Indiana University South Bend, IN
University of Maryland, MD
McGill University, Canada
McMaster University, Canada
Mississippi State University, MS
University of North Carolina, NC
Northwestern University, IL
San Diego State University, CA
TRIUMF, Canada
Villanova University, PA
Yale University, CN

Collaborating Non-US Institutions:

ATOMKI, Debrecen, Hungary
Basel U., Switzerland
FZ Karlsruhe, Germany
GSI, Germany
Hebrew University, Israel
INAF, Frascati, Italy
INFN LUNA, Gran Sasso, Italy
Kocaeli University, Turkey
KVI Groningen, Netherlands
Monash University, Australia
n-ToF CERN, Switzerland
RCNP Osaka, Japan
U. Surrey, UK
TH Darmstadt, Germany
U. Torino, Italy
UNAM/ININ, Mexico



JINA Astronomy Collaborations

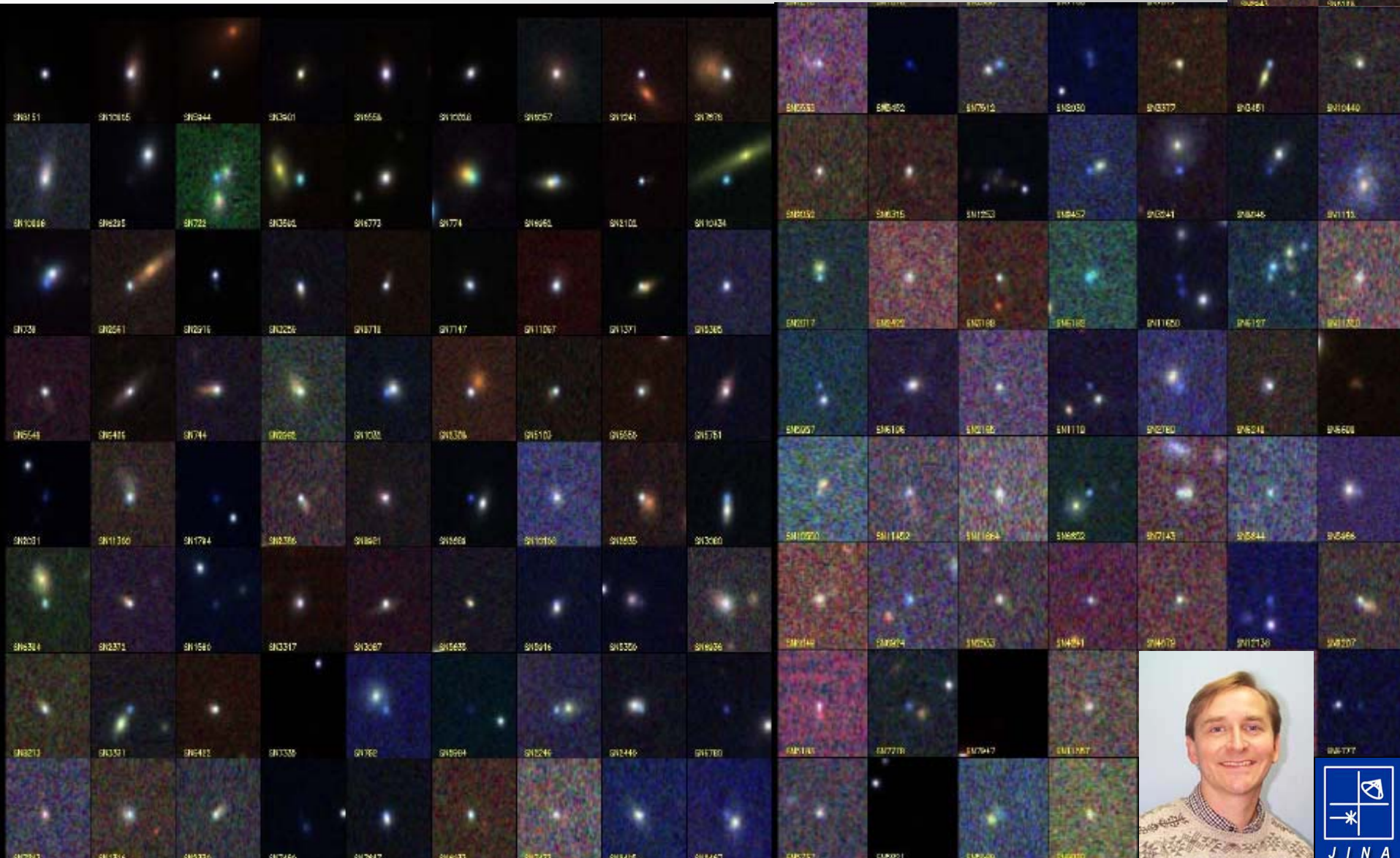
UC Santa Cruz, CA
Carnegie Institution, NY
University of Arizona, AZ
Harvard University, MA
Ohio State University, OH
University of Texas, TX
Texas Tech University, TX
McDonald Observatory, TX
Princeton University, NJ
US Naval Observatory, DC
Fermi Laboratory, IL
Rensselaer Polytechnic Institute, NY
Case Western Reserve University, OH
Johns Hopkins University, MD
University of Wisconsin, WI
Indiana University, IN
University of North Carolina, NC
University of Washington, WA
American Museum of Natural History, NY
New Mexico State University, NM

National Observatory of Japan
University of Tokyo, Japan
Seoul National University, Korea
Australian National University
Cambridge University, UK
Potsdam University, Germany
Observatoire d' Paris, France
ESO, Germany
Padova University, Italy
Niels Bohr Institute, Denmark
University of Sao Paulo, Brazil
Trieste Observatory, Italy
MPI for Astronomy, Germany
University of Basel, Switzerland



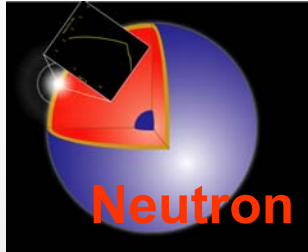


SDSS-II SN Discoveries





JINA Research Goals



Neutron Star Laboratory

rp-process nucleosynthesis
electron capture reactions
pycno-nuclear reactions

Origin of Elements & Supernovae

r-process nucleosynthesis
p-process nucleosynthesis
 α -process
weak r-process neutron sources
weak interaction
thermo-nuclear reactions

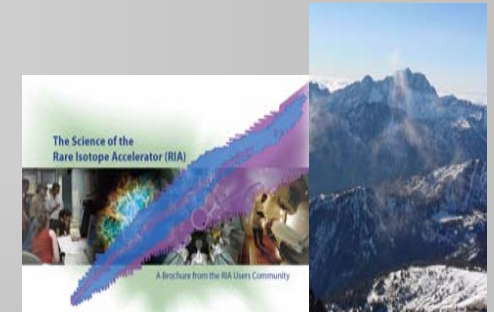
Origin of Elements in Stars

nucleosynthesis & stellar evolution
s-process & AGB stars
early stars nucleosynthesis
reaction rate compilation

Large Collaborative Programs

SDSS-2-SEGUE/SUPERNOVA
CANDU/LBT

ARIA
DUSEL
VISTAR/GSI



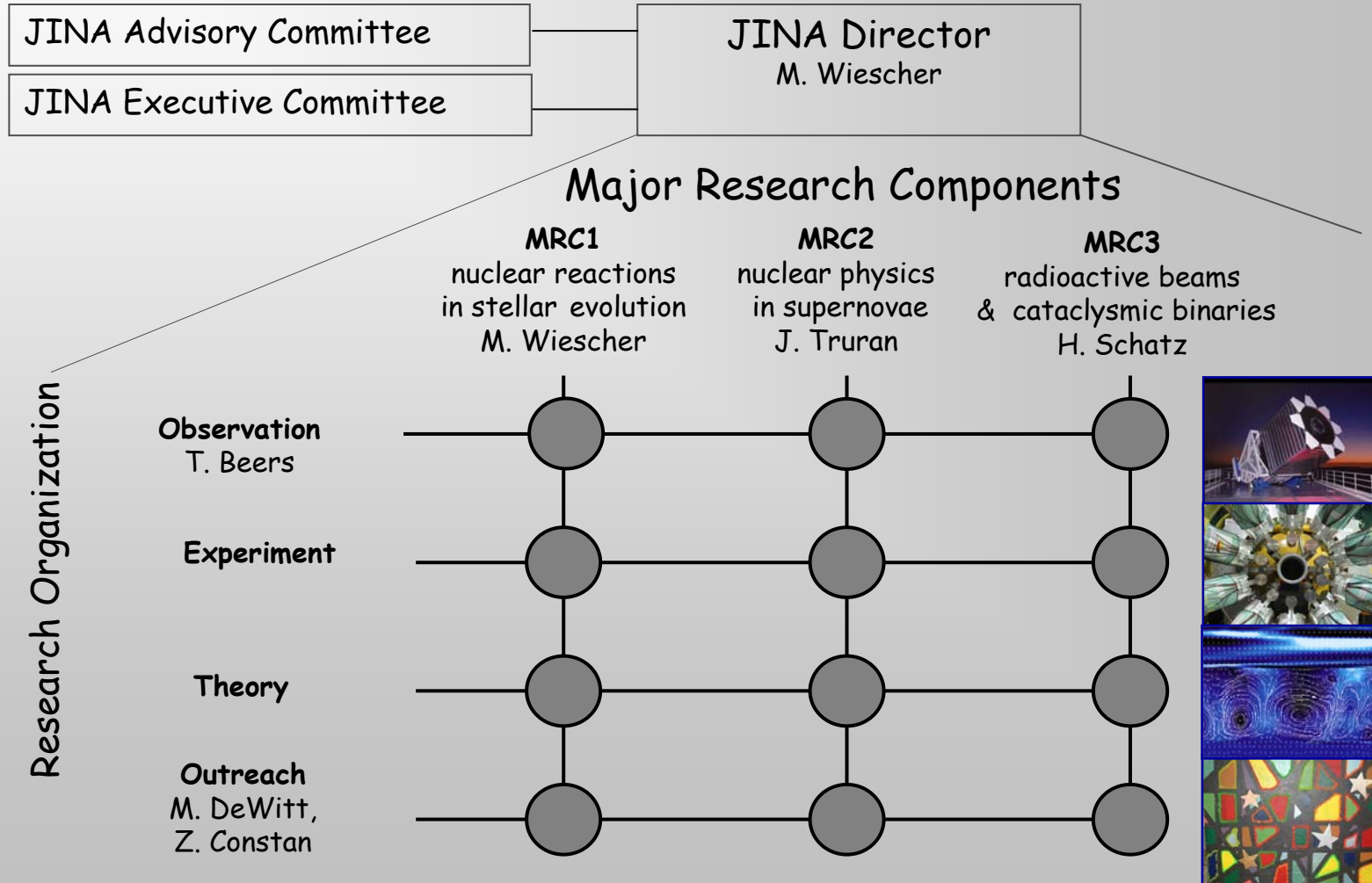
Coupled to realistic
model simulations



Nuclear Theory Initiative ND&ANL
SciDAC & ASC Associations



Organizational Structure of JINA



JINA Research Components

MRC-1: Low Energy Nuclear Reactions and Stellar Evolution

Spokesperson: M. Wiescher (Director)

Low energy reactions in stellar H burning:

Neutron sources in stellar He burning:

Low energy reactions in stellar He burning:

Nuclear processes in stellar C burning:

s-process branch points as stellar thermometer:

Observational signatures of the s-process:

Charged particle reactions & WD abundances:

Convection & nucleosynthesis in AGB stars

Pre-collapse massive star nucleosynthesis



ND-UNC-LUNA

ND-FZK-Monash

MSU-LANL-WMU

ANL-NWU-WMU-Hebrew

ND-MSU-GSI-UNAM

ND-ININ-TRIUMF

ND-LANL-Torino

LANL-MSU-ND-FZK-n_ToF

MSU-ND-UoC-SEGUE

ND-LANL-FZK-Monash

LANL

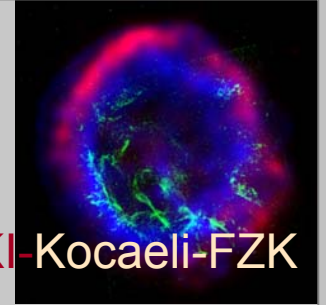
LANL-UCSC-SciDAC



JINA Research Components

MRC-2 Nuclear Physics in Supernova

Spokesperson: J. Truran (Associate Director)



Nuclear reactions in the p-process
Simulations of the p-process
Nuclear reactions in the α -process
Simulation of r-process in SN models
R-process network and database
Nuclear data for the r-process

weak interaction in SNC

Type II SN shock-front models
SN impact in ISM
Type Ia SN modeling
Type Ia SN ignition conditions
Nucleosynthesis in type Ia SN models
Observational signatures of the r-process
Nuclear data in the neutrino-p process

ND-MSU-ATOMKI-Kocaeli-FZK
MSU-ND-FZK
ANL-Hebrew-NWU
UoAz-MSU-LANL-Chicago
MSU-Chicago-GSI
MSU-ND-Mainz
MSU-GSI-Mainz
MSU-RCNP
MSU-GSI
ND-MSU
JINA-UoAz
ND-UoC-MSU-MPE
MSU-UoC, LANL
ND-MSU-ANL-LANL-Joffe
UoC
MSU-SEGUE
MSU-GSI



JINA Research Components

MRC-3: Reactions with Radioactive Beams & Cataclysmic Binary Systems

Spokesperson: Hendrik Schatz (Associate Director)

Radioactive beams in HCNO & NeNa cycles	ANL-UNC
CNO-break-out feeding the α p-process	ND
	ANL-NWU-Yale
Nuclear reactions in the α p & rp-process (experiment and theory)	ND-MSU-RCNP-KVI
	MSU-ND
Nuclear masses for the rp-process	MSU-ND, ANL, MSU-GSI
Weak interaction in NS crust	MSU-LANL-GSI-Mainz
Pycnonuclear reactions in NS crust	ND-MSU-USP-Joffe
Accretion mechanism on WD & NS	ND-LANL-Villanova
XRB nucleosynthesis modeling	UCSC-LANL-MSU
	MSU-ND-LANL-Basel
	MSU-Chicago
Superburst models	MSU-UCSB-McGill
Surface oscillation modes on NS	UCSB
Nova modeling	UCSB, Chicago
EOS experimental observables	MSU-CIAE





JINA Research Organization

ROC-1: Observation Collaborations & Activities

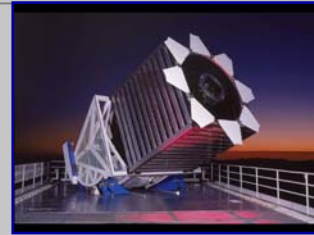
Spokesperson: T. Beers (Associate Director)

SDSS-II-SEGUE/SUPERNOVA

SOAR, LBT, other telescopes

MSU-ND-et al.

MSU-ND-et al.



ROC-2: Experiment Collaborations

Spokesperson: H. Schatz/M. Wiescher

MSU developments

ND developments & St. George Separator

MSU-ND joint developments

JINA-ARIA

JINA-DUSEL

JINA-FAIR

MSU-et al.

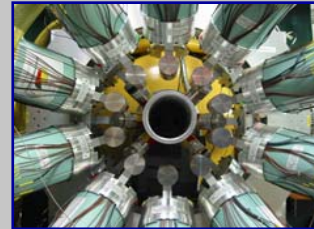
ND-et al.

MSU-ND-et al.

ANL-MSU-ND-ORNL

ND-UNC-CSM-LBNL-LUNA

MSU-ND-FZK-ViSTAR



ROC-2: Theory Collaborations

Spokesperson: ASC for Astrophysical Thermonuclear Flashes

NSCL/MSU Theory Group

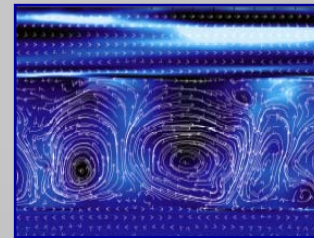
Nuclear Theory Initiative, NTI

Supernova SciDAC

MSU-ND-GSI

ND-UoC-ANL

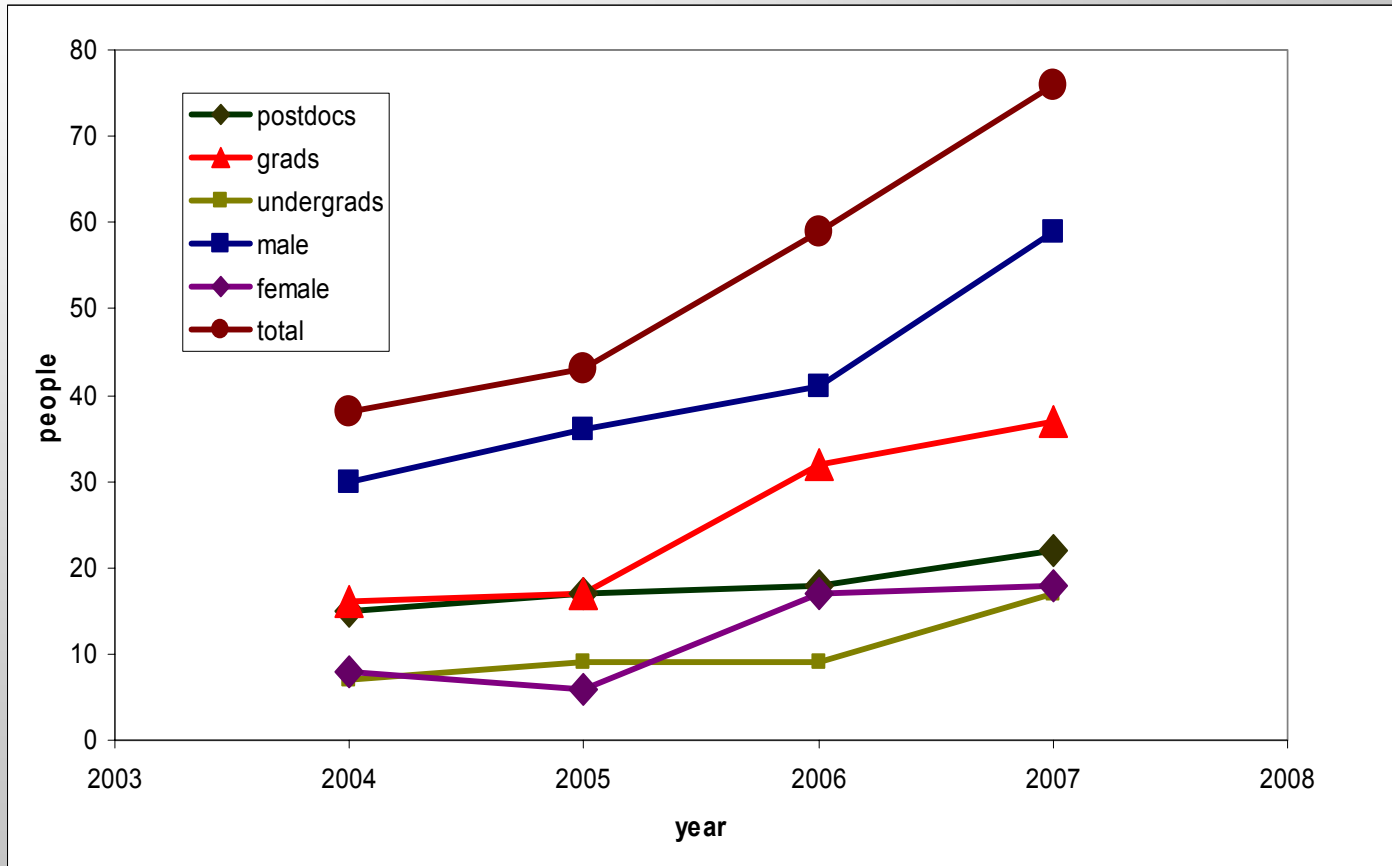
UCSC-UoAz-LANL-LLNL





JINA Personnel

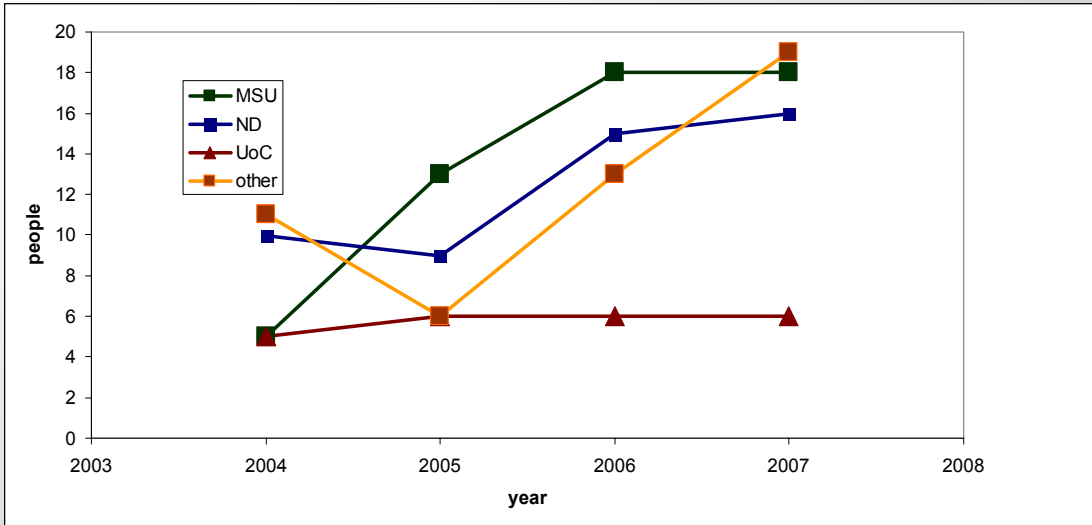
Recorded by JINA office by February 2007



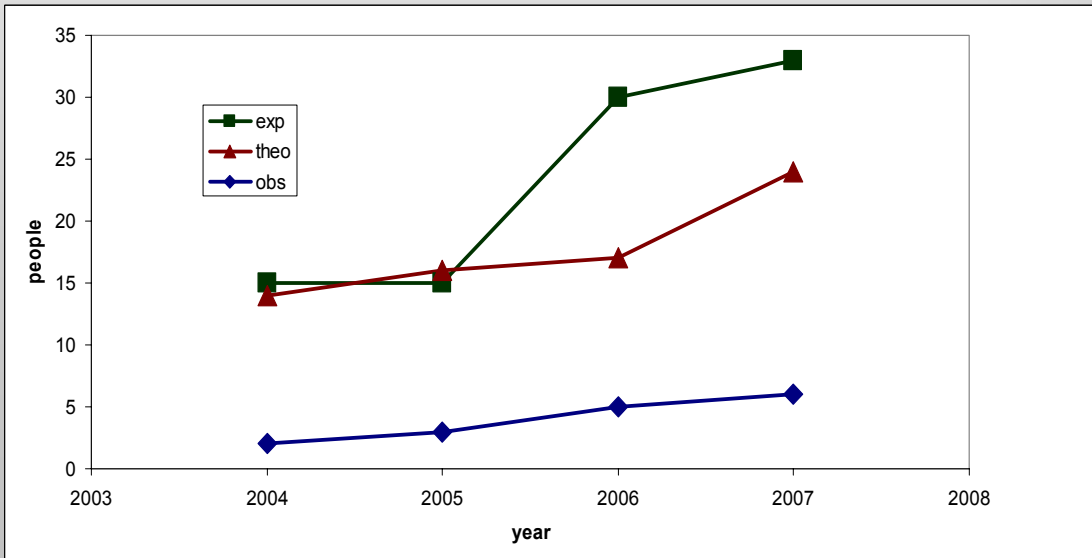
Increase in personnel due to supplementary funding sources as supplement proposals, matching funds, external visitor funds, etc.



Location & Research Direction



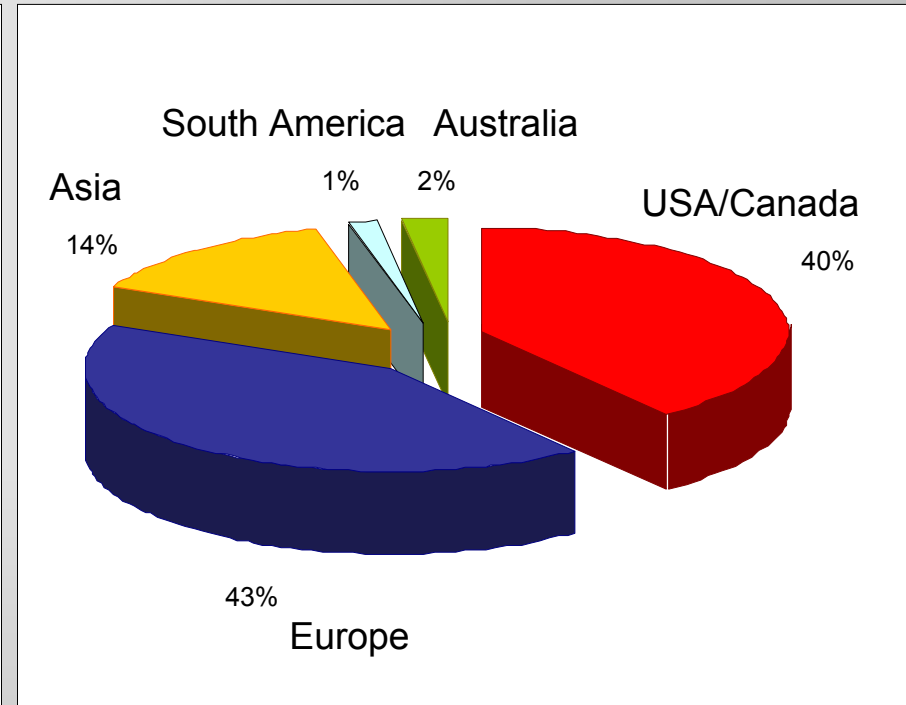
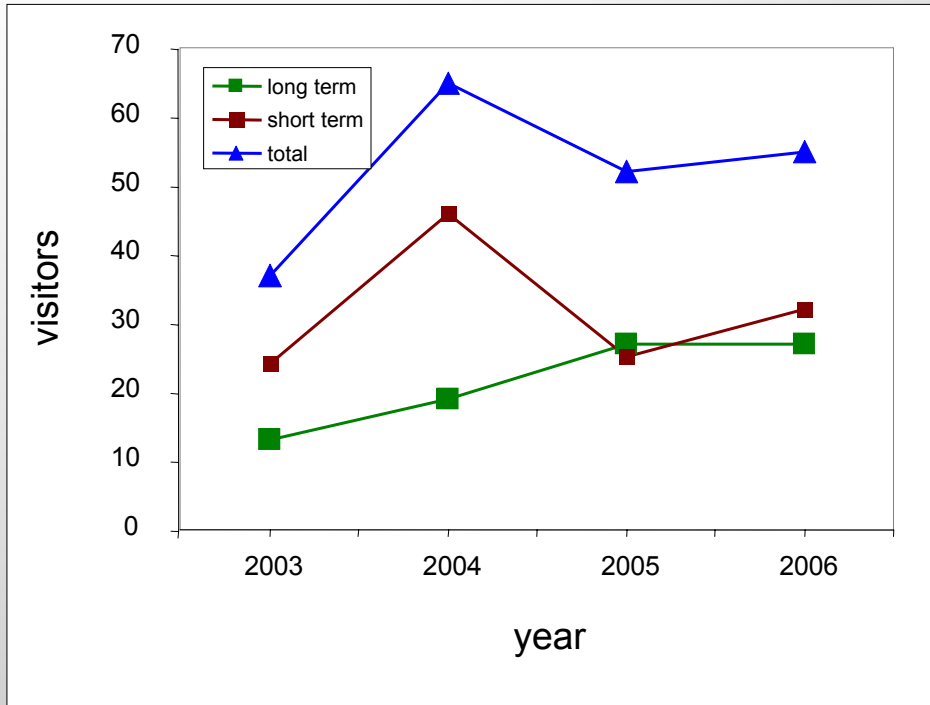
Included are postdocs and students associated with JINA projects at: ANL, CANDU, LANL, VISTARS. Not Included are large collaborative efforts such as n-ToF and SEGUE



Increase in funding for JINA people in observational projects is anticipated for next funding period.



JINA Visitors



Visitor registration routine has been established through the JINA website: http://www.nd.edu/%7Ejina2/html/visit_appform.html

JINA visitors include:

- o Participants in scientific projects and collaborations
- o Seminar and Colloquium speakers

JINA visitors do not include conference or workshop participants



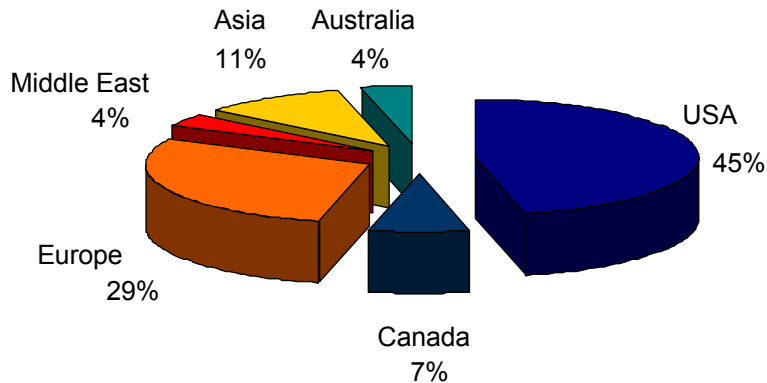
JINA Seminars

■ JINA Lunch Seminar @ MSU

■ JINA-Nuclear Seminar @Notre Dame

■ JINA Lecture Series @ Notre Dame

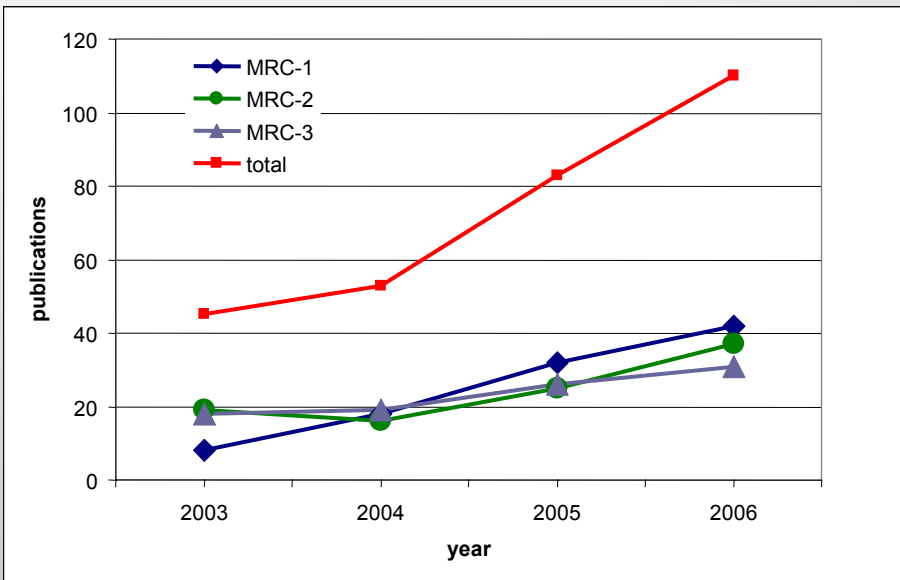
28 registered seminars



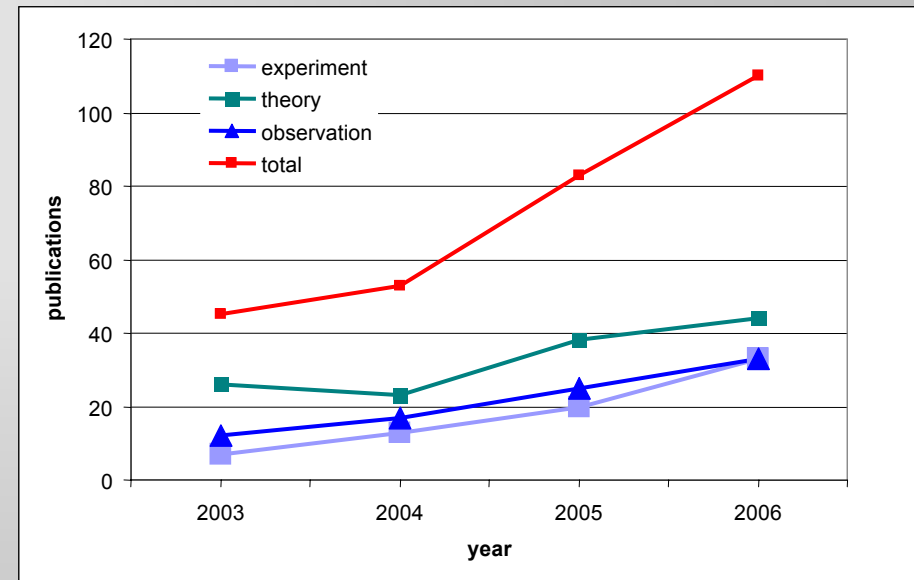
Beacom	John	Ohio State University
Becker	Hanns-Werner	Ruhr University Bochum, Germany
Chen	Alan	McMaster University, Canada
Cyburtt	Richard	TRIUMF, Canada
Deloye	Christopher	Northwestern Univ
Filippone	Bradley	Caltech, Pasadena
Frebel	Anna	Univ of Texas @ Austin
Galaviz Redondo	Daniel	Michigan State University
Hass	Michael	The Weizmann Institute, Israel
Heil	Michael	GSI Darmstadt, Germany
Imbriani	Gianluca	University of Naples, Italy
Korn	Andreas	Uppsala Observatory, Sweden
Lattimer	James	SUNY Stony Brook
Masseron	Thomas	Ohio State University
Nakanishi	Kosuke	Osaka University, Japan
Norris	John	ANU, Canberra, Australia
Raiola	Francesco	Ruhr University Bochum, Germany
Rhee	Jaehyon (Jay)	Purdue University
Roepke	Friedrich	Univ of California, Santa Cruz
Sasamoto	Yoshiko	University of Tokyo, Japan
Seitzzahl	Ivo	University of Chicago
Snedden	Christopher	University of Texas
Starrfield	Sumner	Arizona State
Steiner	Andrew	LANL/MSU
Terrasi	Filippo	University of Naples, Italy
Uesaka	Tomohiro	University of Tokyo, Japan
Watts	Anna	MPI for Astrophysics, Germany
Zinner	Nikolaj	University of Aarhus, Denmark

Publication Record

A total of 291 refereed publications and 320 invited talks from 2003-2007



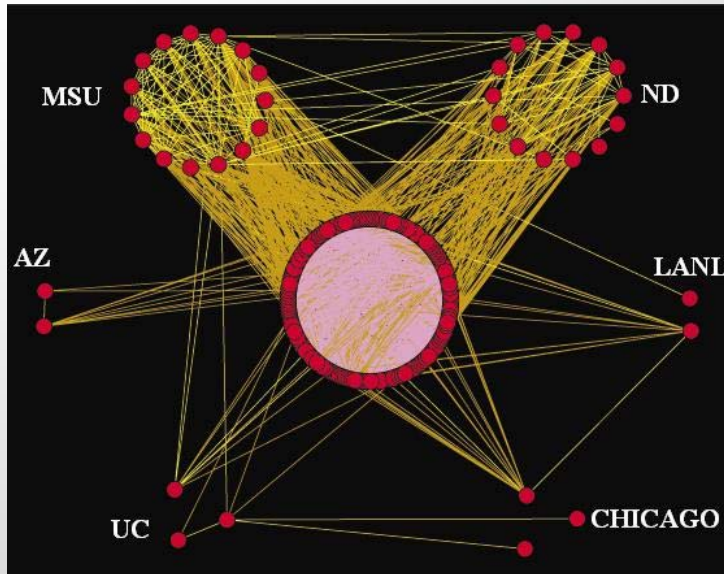
On average: 24 publications in MRC-1, MRC-2, MRC-3 per year.



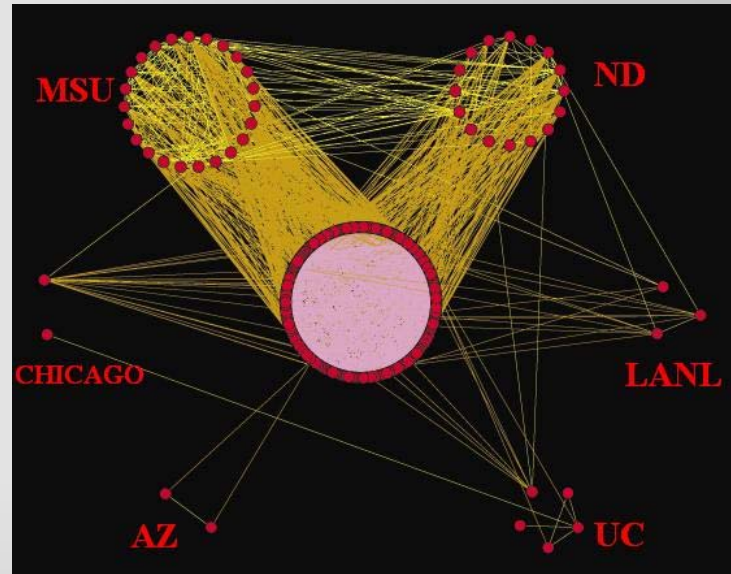
On average: 18 publications per year in experiment, 33 publications per year in theory, and 22 publications per year in observations.

Scientific Interaction within JINA

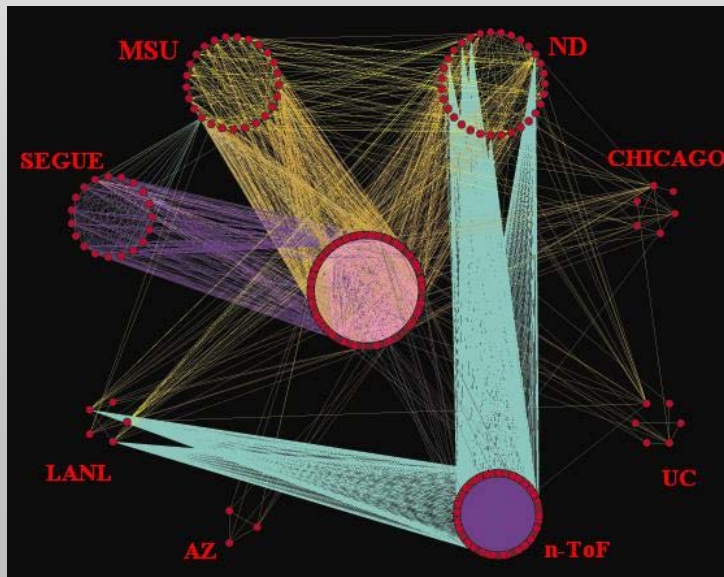
2003/04



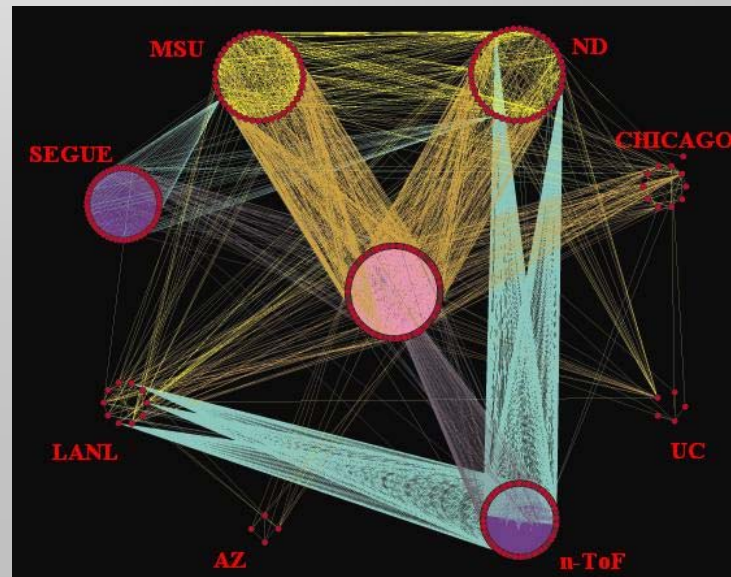
2004/05



2005/06

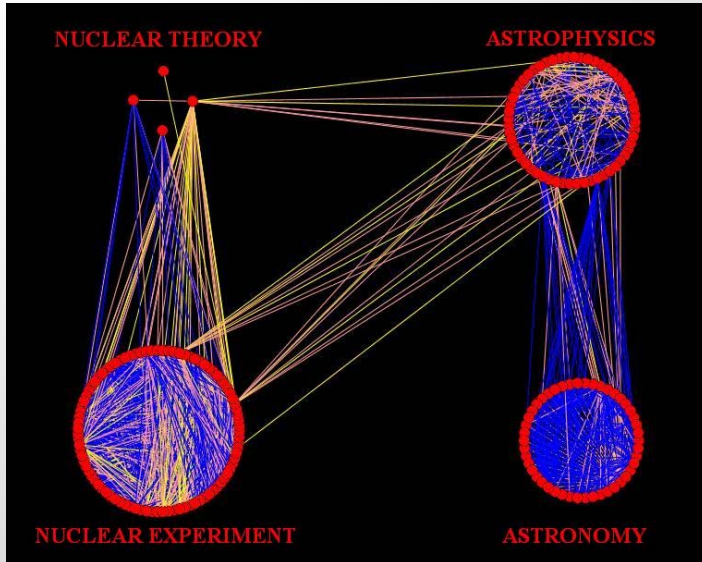


2006/07

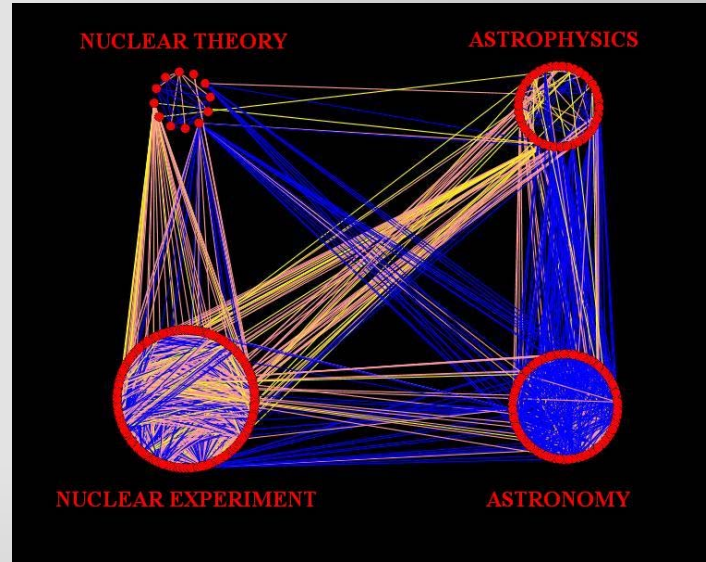


Interdisciplinary Interaction

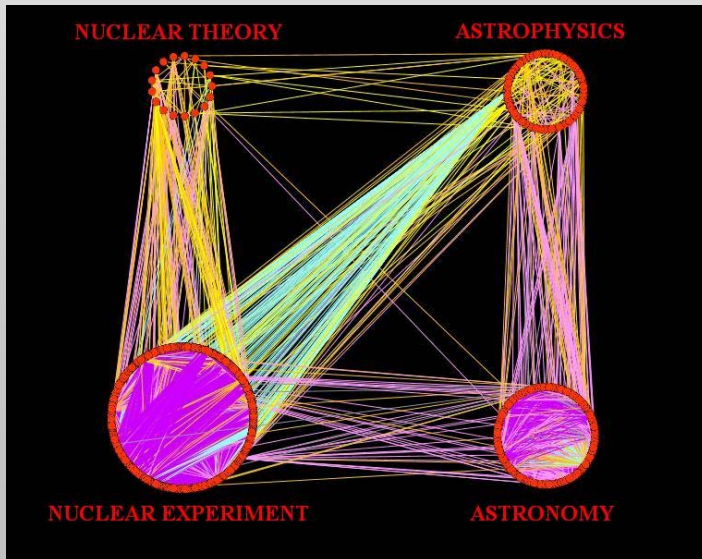
2003/04



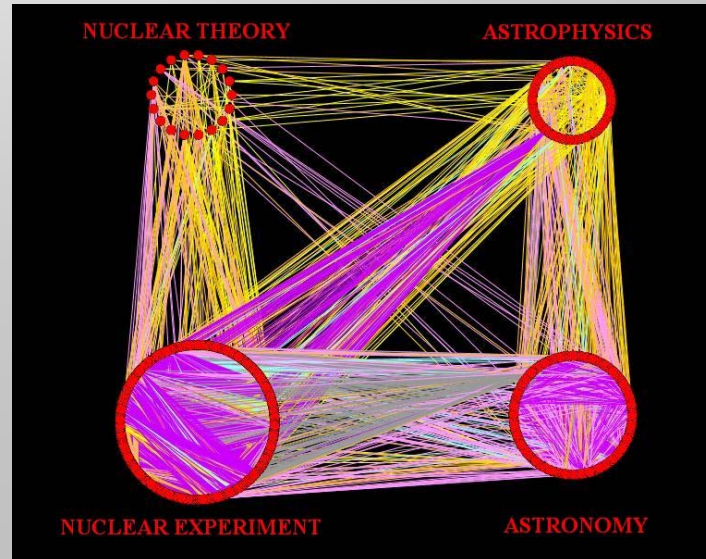
2004/05



2005/06



2006/07



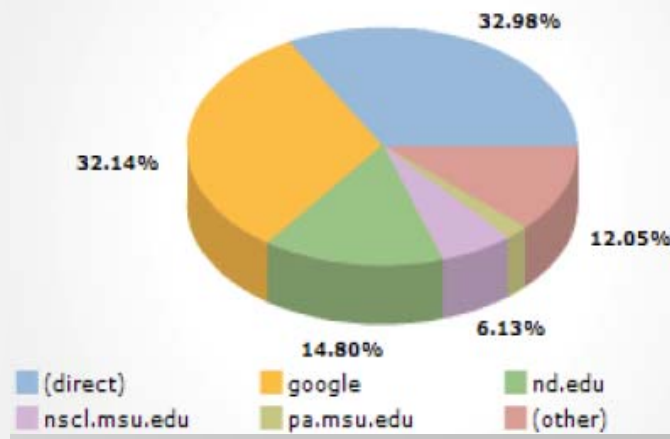
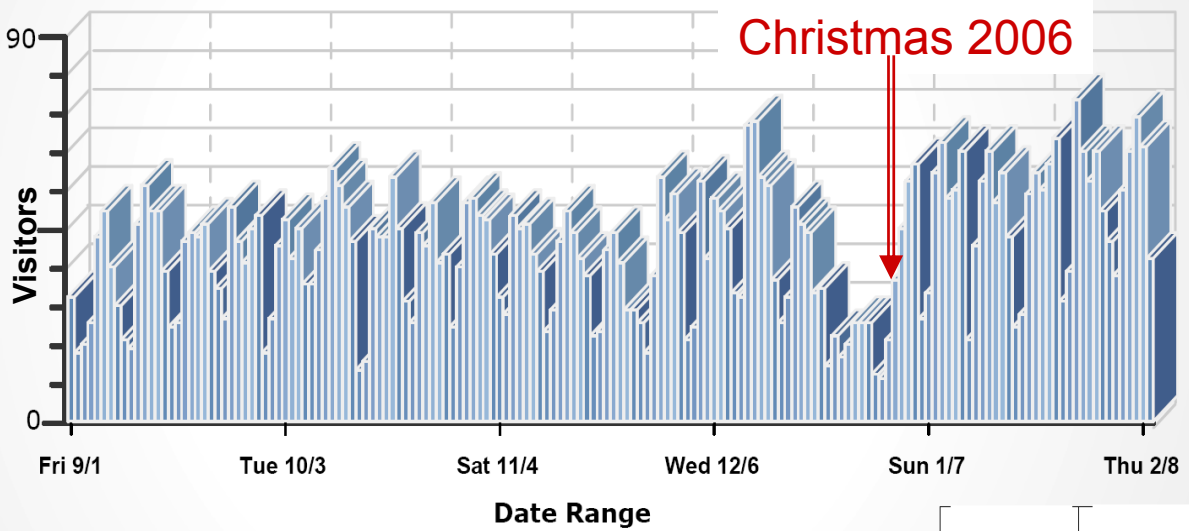


JINA as NSF PFC center the outreach concept

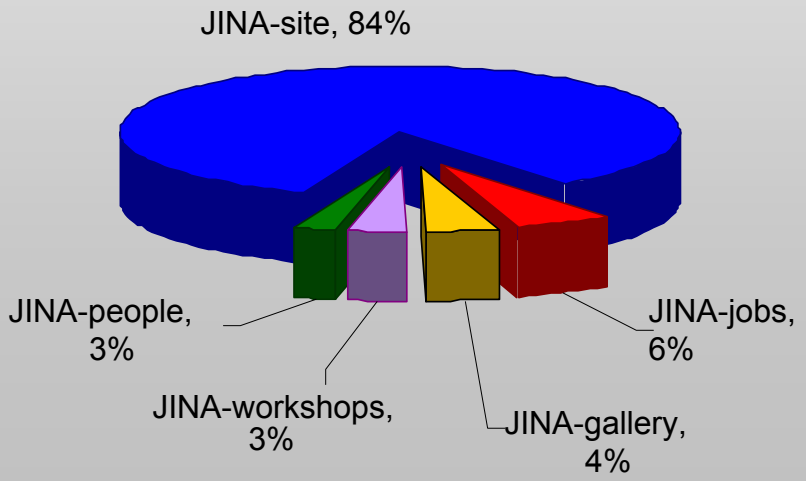
- Developing new concepts for communication & exchange
 - JINA website
 - JINA Virtual Journal & SEGUE Virtual Journal
 - JINA ReacLib Library, Star Library
 - Organization of goal oriented workshops on JINA related topics
 - Support for conferences & workshops in the field
 - Training courses and schools
- Outreach
 - Outreach through art and entertainment
 - Outreach through support of existing programs
 - Outreach through research and training
 - New concepts in planning



JINA web stats



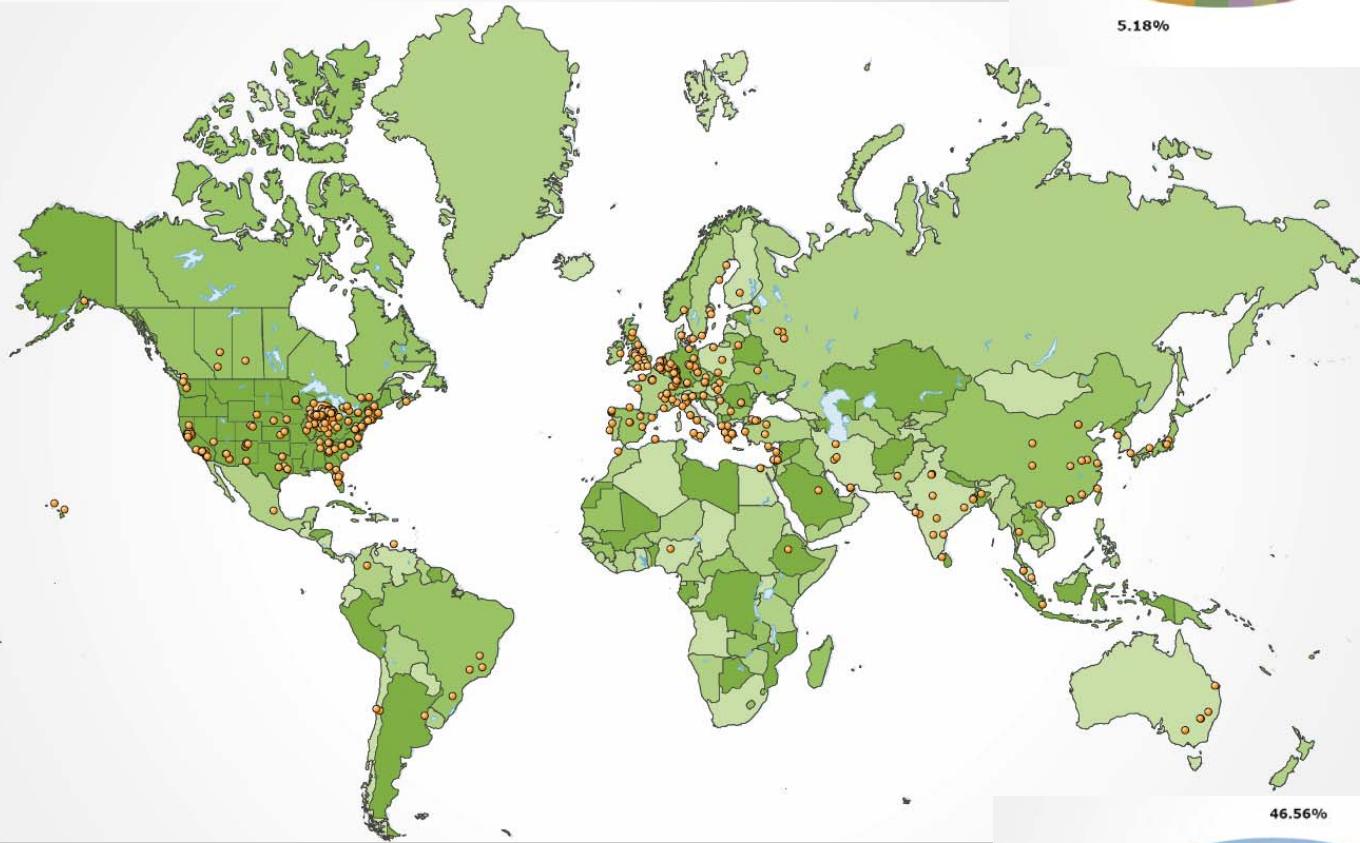
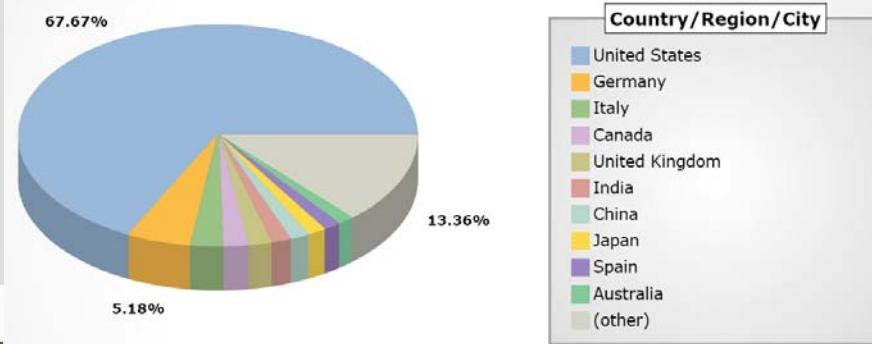
on average ~ 55 visitors/day
on average ~ 5 pages/visit



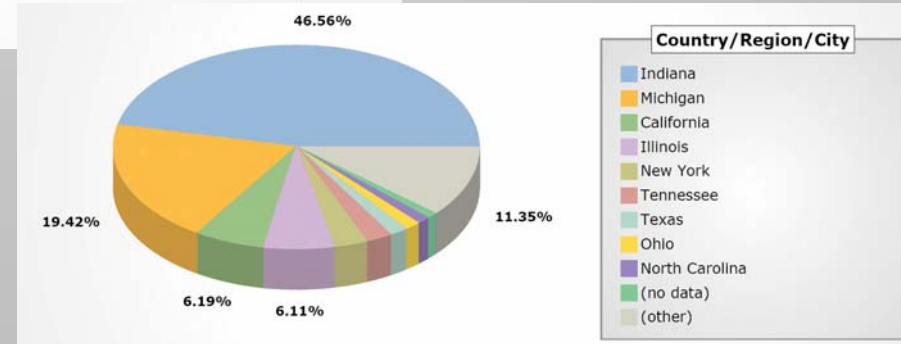
~20,000 users of the JINA web page since March 2006 advisory committee meeting!



JINA geo stats



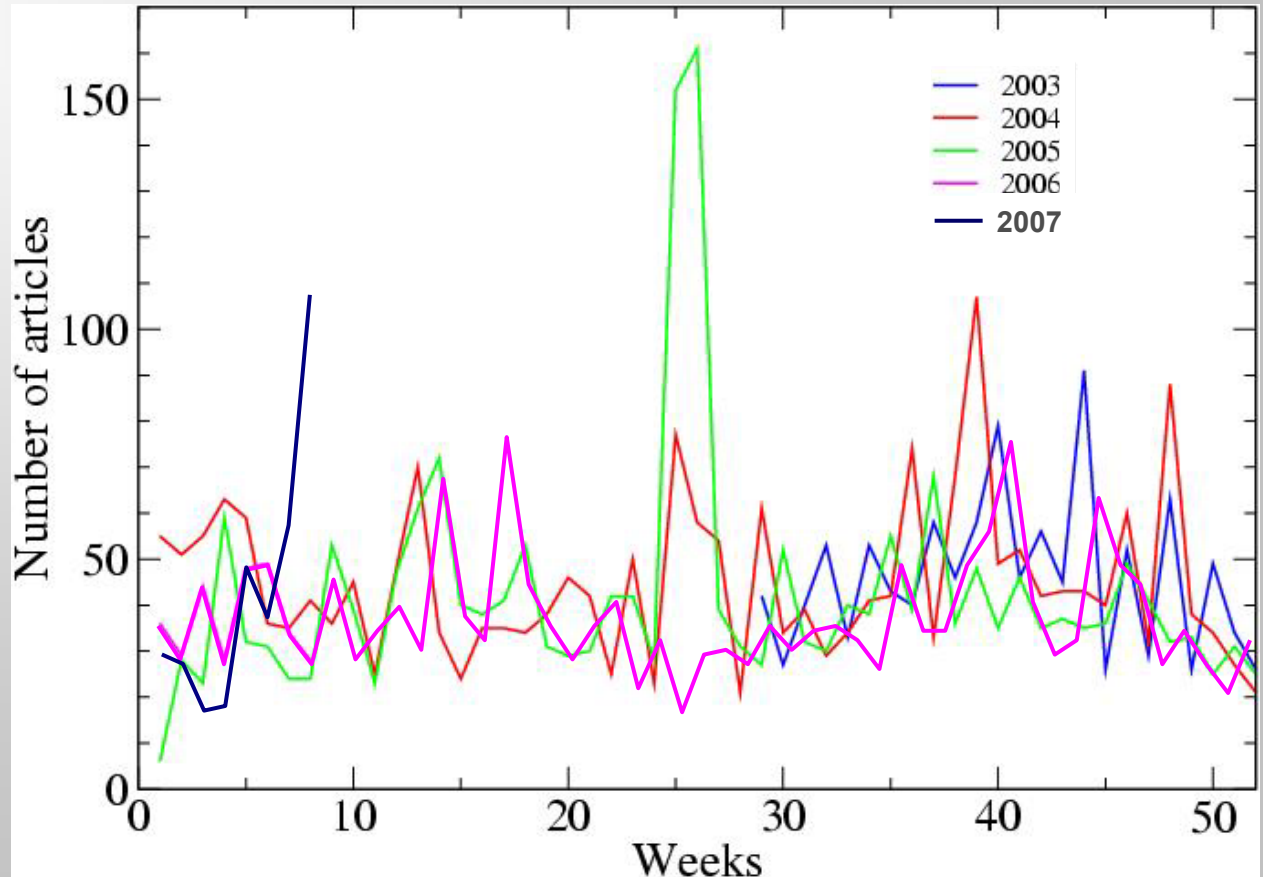
Recorded visits from ~100 countries





JINA Virtual Journal

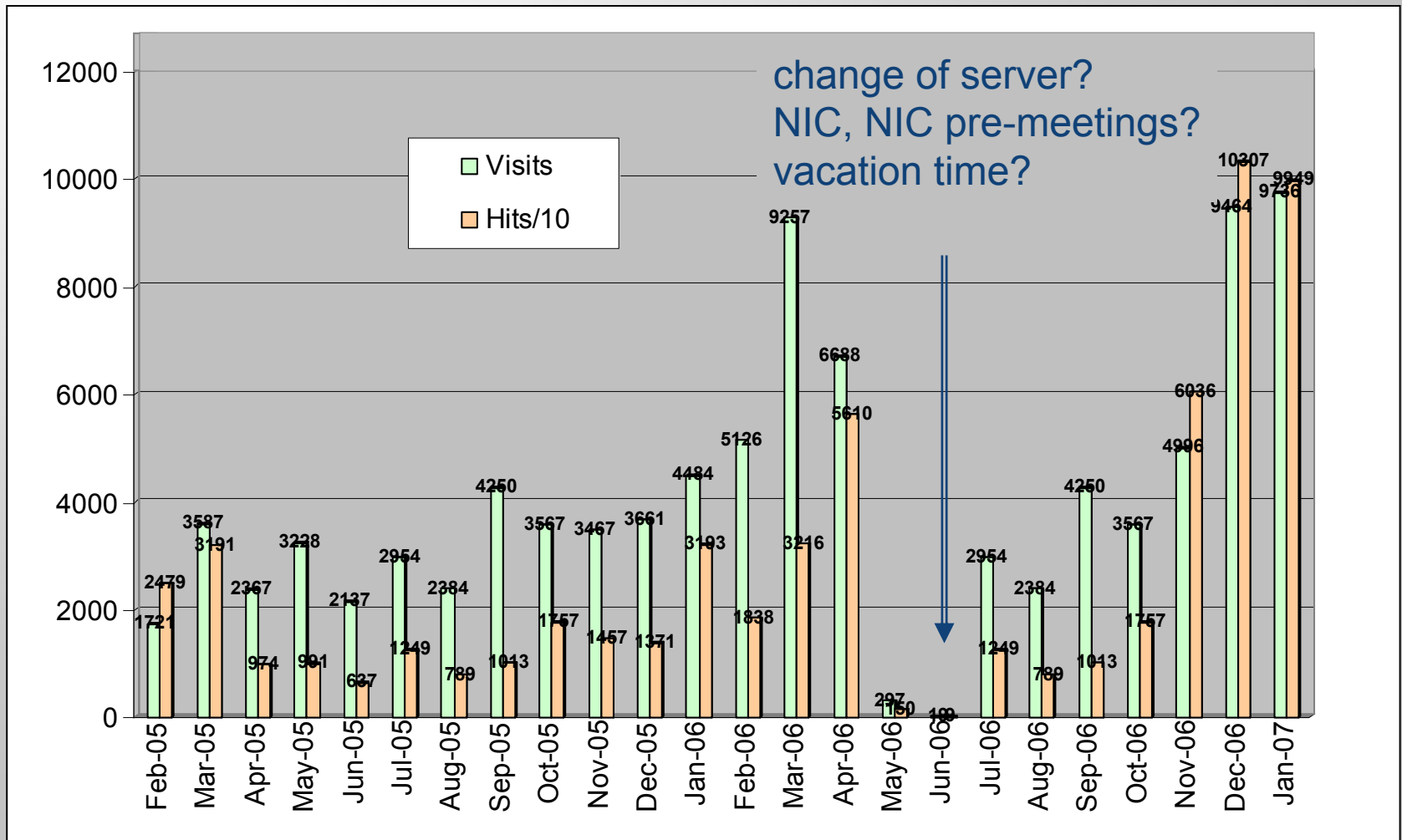
Number of Nuclear Astrophysics related publications



Virtual Journal
Website Activity

On average 50 papers/week

JINA Virtual Journal, monthly summary





REACLIB & STARLIB

REACLIB project under development between MSU-ND -ORNL to maintain up-dated reaction rate library and provide on-line reaction rate library access. The review and implementation of new experimental or theoretical results will be the responsibility of the editorial board.

STARLIB project under development between MSU- Princeton to build an easily accessible database that reports all information, on a star-by-star basis, for elemental abundance data that has been reported in the recent literature (which we take to be 1990 and forward) for stars with reported metallicities $[\text{Fe}/\text{H}] < -1.0$.

Details & demonstrations will be provided in the next presentation!



Communication, Exchange & Training

For fostering the Center spirit and for the developing and maintaining of collaborations & MRC initiatives & momentum



Project design and development through topic and project oriented workshops



Communication and training through technique oriented schools



Conference Programs

JINA-collaborative workshops with other research centers

- | | |
|------------------------------------|---------------------|
| 1. INT on RIA physics | 2004, 2005, 2006 |
| 2. VISTARS on Nuclear Astrophysics | 2005, 2006, 2007 |
| 3. UCSB on Nuclear Astrophysics | 2004, 2005, 2006 |
| 4. Aspen on Nuclear Astrophysics | 2003, 2005, (2008?) |



JINA-MSU/ND: topical workshops on nuclear astrophysics

Underground Accelerator; Supernova Collapse; AGB Stars; Galactic Chemical Evolution; Equation of State; r-Process; s-Process; Galactic Radioactivity; Capture Gamma Rays;



JINA-Frontier: student/postdoc organized workshops on JINA physics

- | | |
|----------------------------------|---------------|
| 1. Projects at JINA institutions | MSU fall 2005 |
| 2. Projects at JINA institutions | ND fall 2007 |



JINA-CARINA: joint workshops on nuclear reaction data

1. U. Basel (June 2006),
2. ECT Trento (May 2007),
3. Notre Dame London (October 2007)





JINA Schools

Two weeks training program in tools in Nuclear Astrophysics.
Well liked by students; participation ~30-40 people

1st School: Charge Exchange Reactions; Brown, Martinez-Pinedo

2nd School: R-matrix theory & applications; Azuma, Vogt

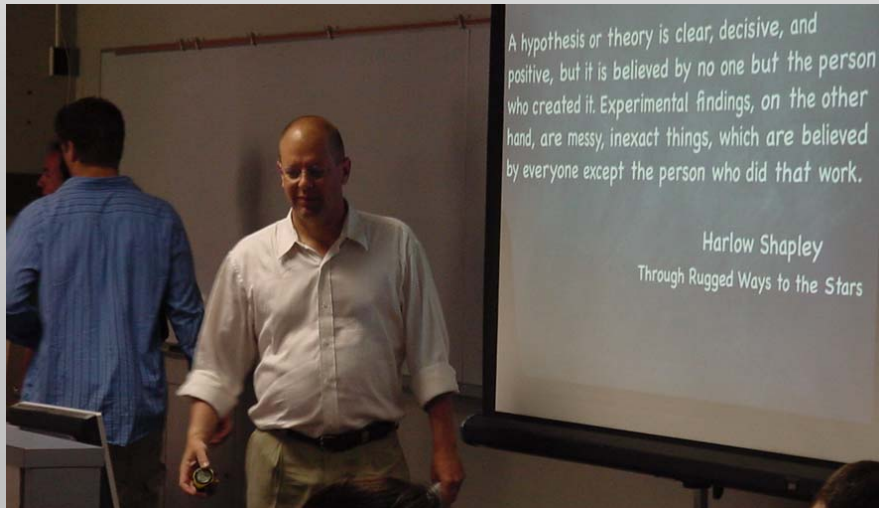
3rd School: Network techniques & applications; Meyer, Timmes

4th School: Shell model theory & applications; Hjorth-Jensen, Brown

5th School: Direct Reaction Processes; Nunes, Tostevin

6th School: Nuclear Masses: Model & Experiments; Truran, Roberts, Aprahamian

7th School: Stellar Spectroscopy





JINA Conferences in 2006

1. [The Status of \$^{12}\text{C}\(\alpha, \gamma\)^{16}\text{O}\$, the "Holy Grail" of Nuclear Astrophysics](#)
Kellogg Laboratory @ Caltech, Pasadena, CA, USA, Dec. 15, 2006
2. [The First Stars and Evolution of the Early Universe](#)
Institute for Nuclear Theory, Seattle, USA, June 19 - July 21, 2006
3. [In Heaven and on Earth 2006 Workshop on EOS](#)
McGill, Montreal, Canada, July 5 - 7, 2006
4. [A NIC-IX Satellite Workshop on "Compiled Data Requirements for Modeling in Nuclear Astrophysics"](#)
Basel University, Switzerland, June 23-24(25), 2006
5. [Low Energy Nuclear Astrophysics at the NSCL](#)
NSCL, East Lansing, MI, USA, May 25 - 26, 2006
6. [NSF Site Visit -- Poster Session](#)
University of Notre Dame, IN, USA, May 8 - 9, 2006
7. [3rd ANL/MSU/INT/JINA RIA Theory Meeting](#)
Argonne National Laboratory, Chicago, USA, April 4 - 7, 2006
8. [VISTARS - The 3rd VISTARS Workshop](#)
Russbach, Austria, March 11 - 18, 2006
9. [The Workshop on "The Final Days of Burning"](#)
Santa Barbara, USA, March 9 - 10, 2006





JINA conferences in 2007

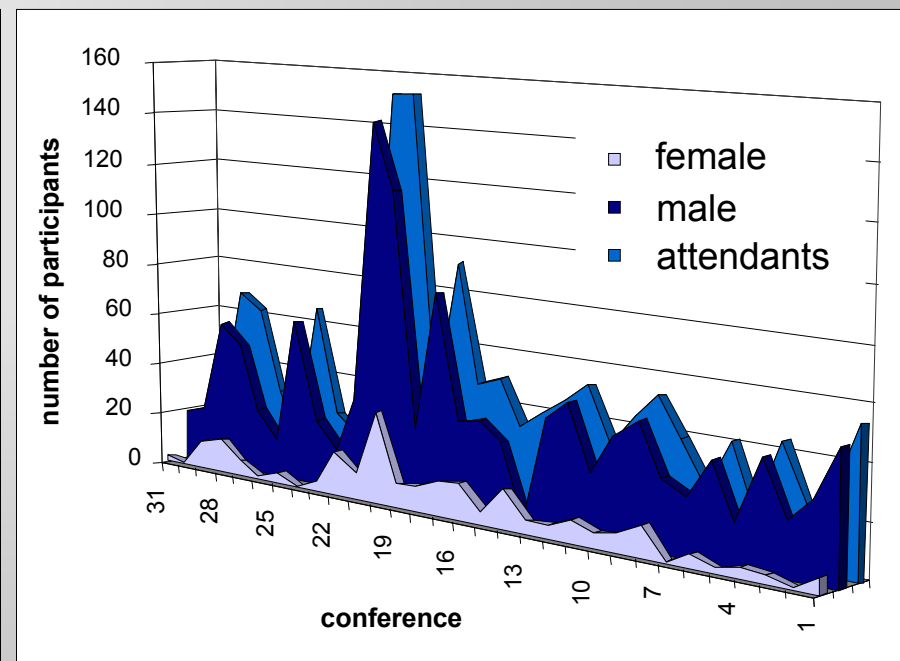
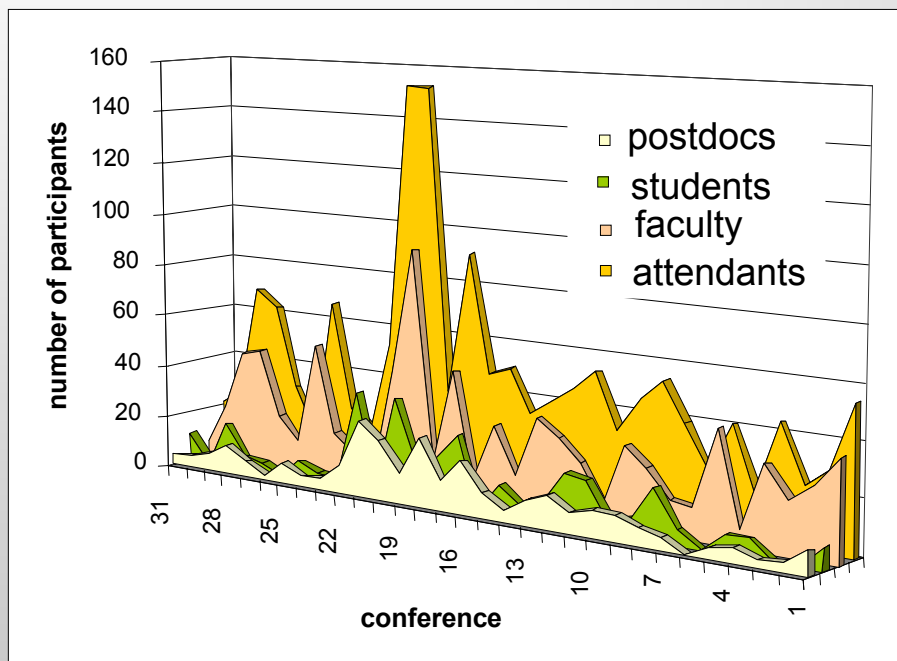
1. [Nuclear Astrophysics: Beyond the First 50 Years](#)
California Institute of Technology, Pasadena, CA, USA, July 24 - 28, 2007
2. [Conference on "First Stars III"](#)
Santa Fe, New Mexico, USA, July 16 - 20, 2007
3. [CARINA-JINA on "Nuclear Physics Data Compilation for Nucleosynthesis Modeling"](#)
ECT*, Trento, Italy, May 29 - June 1, 2007
4. [Workshop on experimental opportunities for nuclear astrophysics at the Frankfurt neutron source of the Stern Gerlach Zentrum - The FRANZ Neutron Source](#)
Forschungszentrum Karlsruhe & Frankfurt University, Germany, May 21 - 23, 2007
5. [JINA Special School on "Nuclear Mass Models"](#)
Argonne National Laboratory, Chicago, USA, May 8-16, 2007
6. [Special School on "Methods of Direct Nuclear Reactions"](#)
NSCL, Michigan State University, USA, April 9 - 20, 2007
7. [4th Workshop on Nuclear Astrophysics](#)
Russbach, Austria, March 3 - 10, 2007
8. [JINA r-Process Meeting](#)
Michigan State University, USA, Jan. 17, 2007





CONF-STATS

Workshops: 28 JINA organized: 18
Schools: 3(+2) JINA co-organized: 13



The distribution depends on the nature and goal of the meeting!

Total number of attendants: 1072
Faculty: 55%
Postdocs: 22%
Students: 24%
Female attendants: 18%



New Outreach Coordinator
Mary DeWitt!

Major Research and outreach

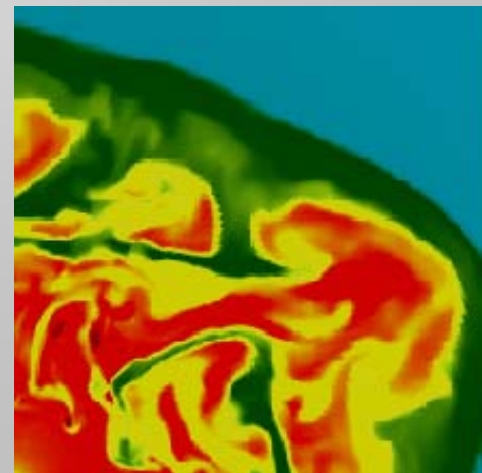
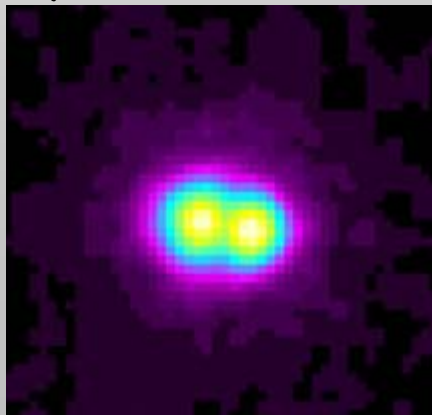


MRC1 - **Nucleosynthesis**
and Stellar Evolution



MRC2 - **Nucleosynthesis in**
Supernovae

MRC3 - **Nuclear Processes in**
Cataclysmic Binaries



Public Outreach Program



The Core Program

Elementary School:	From Art to Science
Middle School:	Science in the classroom
High School:	PAN & PIXE-PAN
College:	Research Opportunities

Opportunity Program (with external funding)

Middle School level:	Sensing our World
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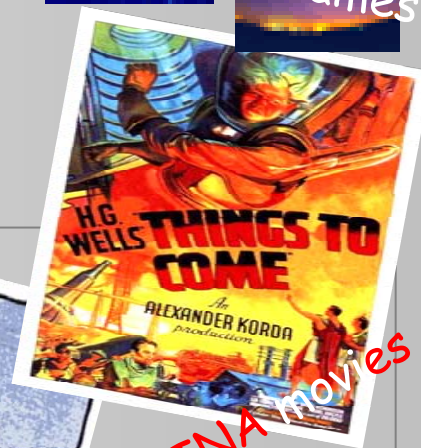


The Exploratory Program

New ideas,
New concepts,
New developments
New publicizing ideas



JINA games



JINA movies

See next presentation

Summary & Conclusion

Many more very successful projects from stellar core to neutron star crust



JINA has gained considerable recognition & visibility in the field through it's research, it's conference, and it's training program! It operates as a multi-institutional PFC center based on strong collaborative and communication links. It operates an active and broad outreach program from elementary school to college level.