



Institute for Nuclear Theory

The national Institute for Nuclear Theory (INT) was established in 1990 by the US Department of Energy and is based at the University of Washington in Seattle, Washington.

Founded in response to the 1988 NSAC Report by the Subcommittee on Nuclear Theory (“Koonin Report”).

National Advisory Committee (NAC)

Chairperson: **Bruce R. Barrett**

Members:

- Baha Balentekin
- Douglas H. Beck
- Jean-Paul Blaizot
- Charlotte Elster**
- Haiyan Gao
- Tetsuo Hatsuda
- Yong-Zhong Qian
- Willam A. Zajc



Institute for Nuclear Theory



Director:

David Kaplan

Senior Fellows:

George Bertsch

Wick Haxton

Dam Thanh Son

Ernest Henley (Associated)

Research Asst. Prof.:

Cecilia Lunardini

Research Associates:

Soon Yong Chang

Christopher Lee

Yusuke Nishida

Paul Romatschke

Shina Tan

Administrative Staff:

Laura Lee

Cheryl McDaniel

Janine Nemerever

Linda Vilett

Angie Windus

Computing Staff:

Richard Coffey

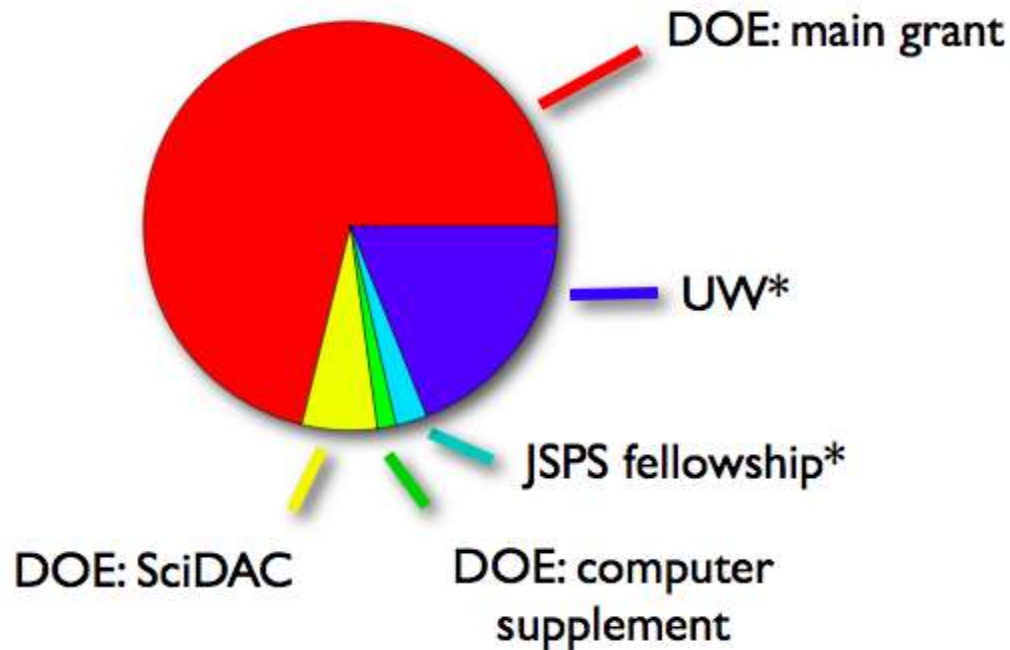
Alan Jedlow

Bill Somskey

[0.0825 FTE each]

Currently: 3 Graduate Students & 1 Visiting Scholar

Sources of INT Funding (07-08)



* In DOE-equivalent dollars

2007-2008 numbers:

DOE:

\$2.44M+supplement:
\$50K/y for 3y for upgrade of
visitor computing facilities

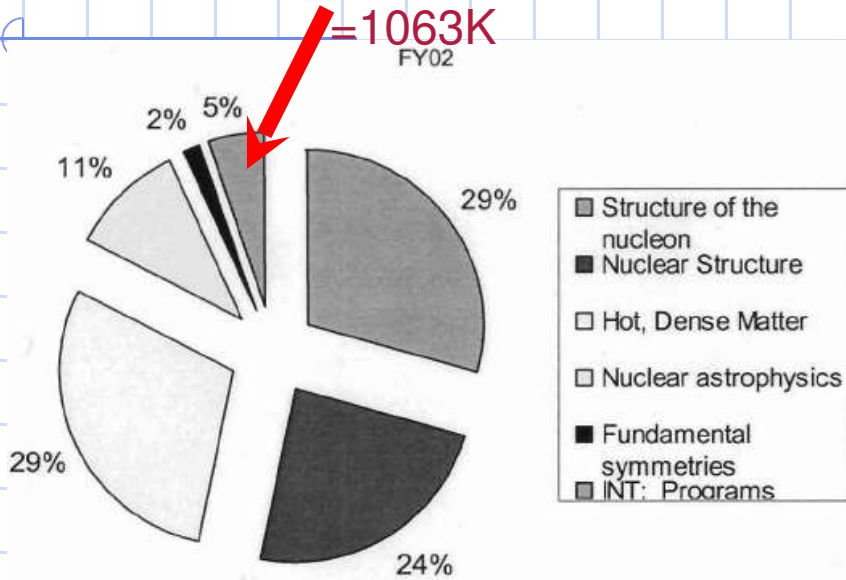
UW pays salaries for:

- Director (Kaplan)
- Senior Fellow (Son)
- 1 5-year Fellow
- 1.3 Pdocs

* JSPS: Japan Society for the Promotion of Science

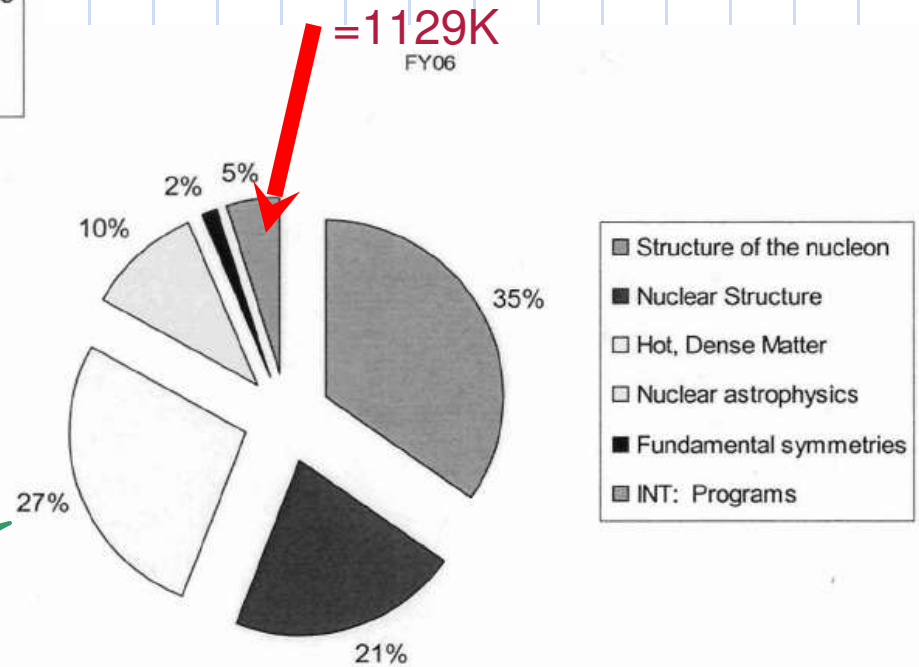
- 1 PDoc (Chang) supported by SciDAC
- this year Lunardini supported by SciDAC

INT in DOE Theory Context



Σ Theory = 20053K

Σ Theory = 22760K



- Structure of the nucleon
- Nuclear Structure
- Hot, Dense Matter
- Nuclear astrophysics
- Fundamental symmetries
- INT: Programs

Goals of the INT:

- ◆ Create research environment where visiting scientists can focus on frontier areas of the field
- ◆ Encourage interdisciplinary research at the intersections of nuclear physics and related disciplines
- ◆ Recruit and nurture the best young researchers, thereby enhancing their professional prospects.
- ◆ Contribute to scientific education through graduate student research, INT summer schools, and co-sponsorship of national schools and workshops.
- ◆ Strengthen international cooperation in nuclear physics.

Activities:

◆ **Programs**

- Sponsor of 4 programs/year focused on specific questions.
- Proposals from community members, reviewed by NAC

◆ **Local Research Effort**

- Led by 4 senior professors and currently 6 younger researchers at the junior faculty and postdoc level.
- Broad research interests & intellectual connections to most programs

◆ **Schools and Workshops (2-5 days)**

- In addition to programs in response to urgent developments in the field

◆ **National Summer School in Nuclear Physics**

- co-sponsored by NSF and INT

◆ **Host of summer REU program**

Specific Current Activities – New Initiatives

- ◆ New Web design and interface for the INT
 - Easier navigation
 - Enhanced content for nuclear physicists as well as a more general audience
 - Upgrade of webserver
 - Increased backup capability for archived on-line talks
 - Plans to have **all** seminars archived as video
- ◆ Upgrade of computer facilities for visitors
- ◆ Acquisition of audio visual equipment to allow video conferencing and remote seminars
- ◆ Increase of visitor reimbursement rate
- ◆ Experiment on joint post-doc with NT Group @ TRIUMF
- ◆ UW Funds:
 - 128 node compute cluster

INT Research Associates & Fellows

Employment History 1990 -

◆ 5 Year Fellows (Research Assist. Profs)

- Total: 10
- Now: 8 in Univ. Faculty positions
1 in Industrial position
1 current Fellow

◆ PostDocs (Research Associates)

- Total: 34
- Now: 6 in Staff position at Nat. Lab.
15 in Univ. Faculty positions
2 in Industrial position
5 in PostDoc positions
5 current PostDocs
1 unknown position

INT Research Associates & Fellows

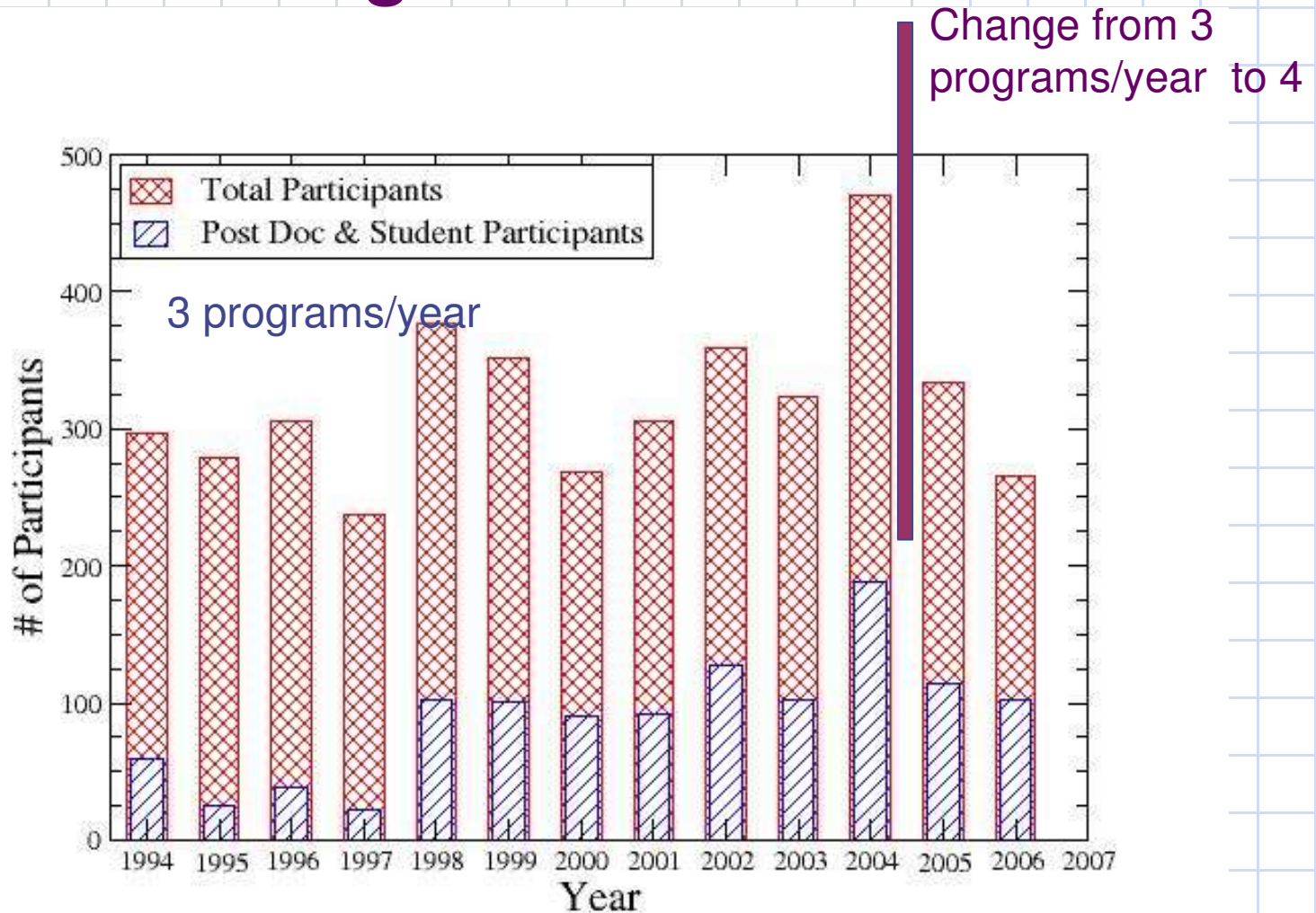
1990 - 2005

	Hadronic Structure	Nuclear Structure	Hot Dense M	Nuclear Astro	Fund Symm	Interdisc
5Y Fellows	9.0	0	2.0	1.0	2.1	4.0
PostDocs	17.2	11.5	20.5	7.5	2.0	4.0

Numbers indicate FTE years

Source S.A. Coon

Programs :

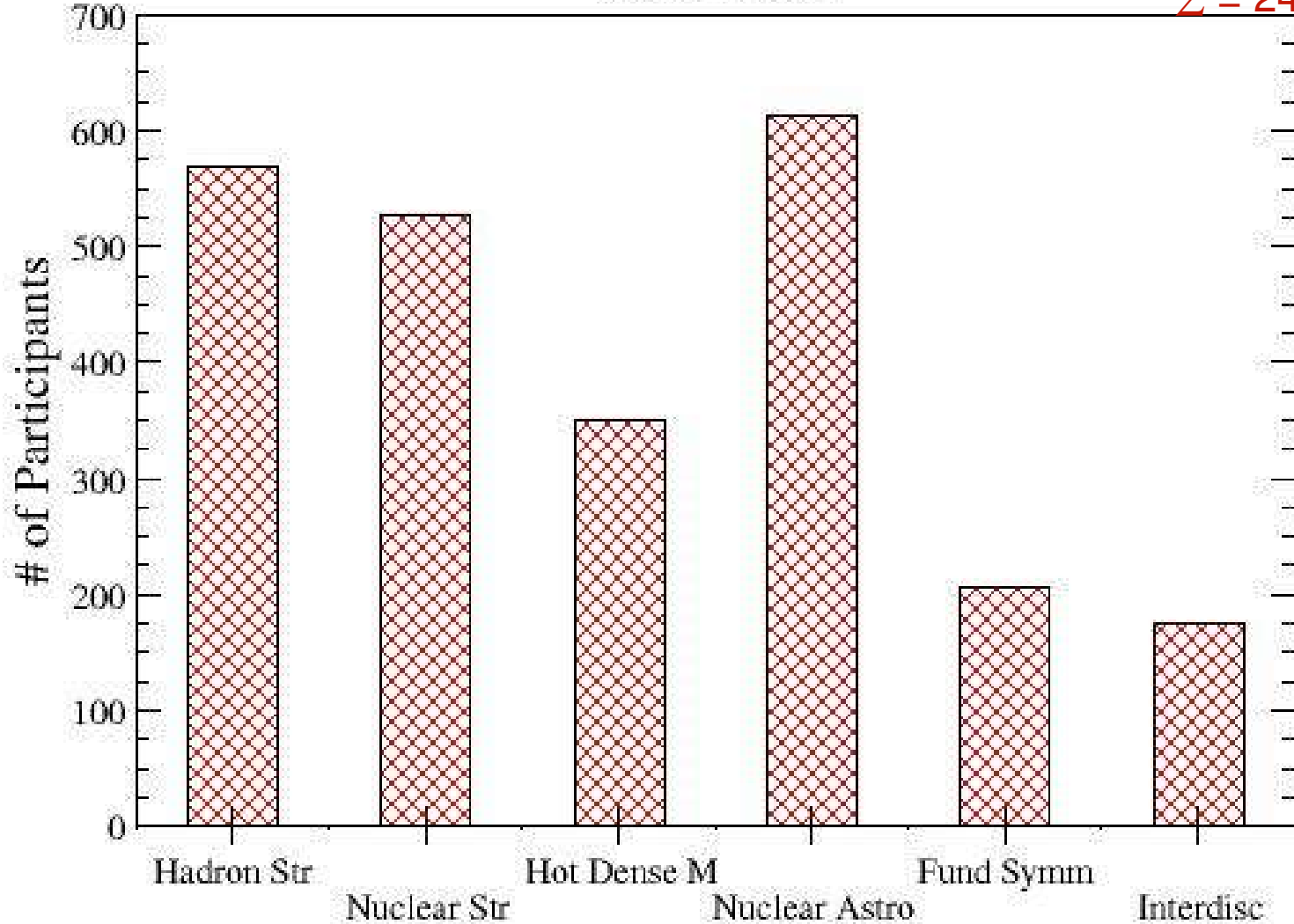


Goals 1,2,5

**Increased Participation of Post Docs & Students in Programs.
(Goal 3)**

Average Number of INT Program Participants
2000 - 2006

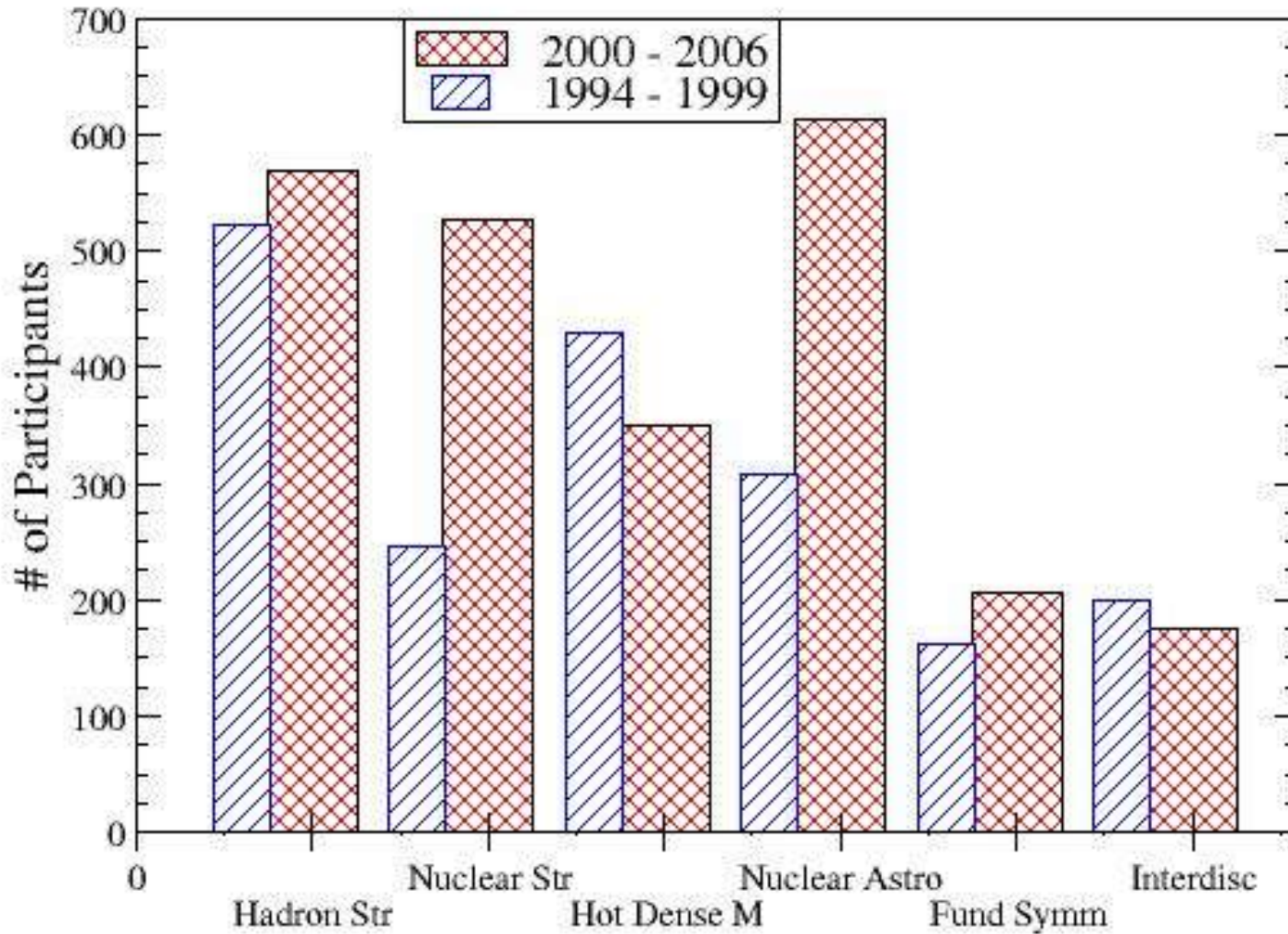
$\Sigma = 2440$



(5 thrusts of the previous LRP)

INT Goals 1,2,5

Average Number of INT Program Participants



$$\Sigma = 2440$$

$$\Sigma = 1867$$

Programs – Creative Research Environment

Selected List of Scientific Achievements with origins related to INT

◆ NSCM - No-Core-Shell-Model

- Inception by Barrett & Vary 1992
 - ◆ In Program: Microscopic Structure Theory
 - ◆ Navratil, Vary, Barrett, PRL 84, 5728 (2000) [**ab-initio NCSM**]

◆ GDP – Generalized Parton Distribution

- Development of idea 1996 by X.Ji
 - ◆ WS Quark & Gluon Structure of Nucleons and Nuclei
 - Ji, PRL 78, 610 (1997)

◆ Colored Glass Condensate for RHIC

- Early phenomenology 1994/96
 - ◆ Venugopalan, Tuchin, Kovchegov ...
 - ◆ E. Iancu, R. Venugopalan, QGP3 (2003)

◆ Modeling of Neutrino-nucleus inelastic interactions

- important to core-collapse supernovae
 - ◆ Qian, Haxton, Langanke, Vogel, PR C55, 1532 (1997)
 - ◆ Today accepted as location of r-process in supernovae

Programs – Creative Research Environment

Selected List of Scientific Achievements with origins related to INT

- ◆ **Coupled Clusters with Chemistry Methods**
 - Collaboration Dean, Piecuch, Hjorth-Jensen started
 - ◆ WS 2002 on Advanced Computational Methods for Solving the Nuclear Many-Body Problem
 - ◆ Kowalski, Dean, Hjorth-Jensen, Papenbrock, Piecuch, PRL92 132501 (2004)

- ◆ **EFT for low energy nuclear physics & few body systems**
 - WS 1998 & 1999 started series of seminal publications
 - ◆ Kaplan, Savage, Wise NP 478 (1996); NP 534 (1998)
 - ◆ Bedaque, Hammer, van Kolck PRC58 (1998); PRL 82 (1999)

- ◆ **AdS/CFT correspondence to compute jet quenching**
 - WS 2003 on QCD & String Theory
 - Hydrodynamic theory of heavy ion collisions
 - ◆ Policastro, Son, Starinets, JHEP 2002

- ◆ **Universal Nuclear Energy Density Functional UNEDF**
 - WS 2005 on Nuclear Structure near the limits of stability
 - focus on MFT and EDF
 - ◆ Discussions on UNEDF SciDAC project started
 - ◆ Now funded with Project Leader Bertsch

Professional Recognition of INT Senior Fellows

◆ George Bertsch:

- 2003 Bonner Prize (APS)

◆ Wick Haxton:

- 2003 Bethe Prize (APS)

◆ Wick Haxton:

- 1999 elected to the National Academy of Science