



# NSERC GSC-19 2006-07

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Chair's Report  
CAP Congress  
Saskatoon, June 2007



# Envelope Funding

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- Unique to Subatomic Physics GSC-19
  - Individual, Group, Project, RTI and MRS requests are judged together
- Crucial
  - Strong country-wide connections/collaborations among individuals and groups at universities, TRIUMF, SNOLAB and PERIMETER
  - Long-term, large-scale projects: commitment
  - Make decisions taking into account future projections and goals
  - Maintain balance between operating and capital
    - capital is always in danger of being eaten by operating



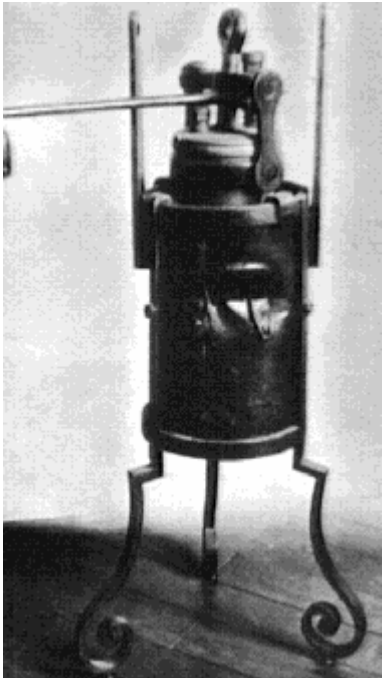


# SAP Long Range Plan

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- Released in fall 2006 – guide for GSC
- Priorities:
  - ATLAS, ISAC, SNOLAB, T2K, ILC, breadth and theory
- Various funding scenarios examined:
  - Increase by 100% over 10 years
  - ...
  - ...
  - Status quo with SNOLAB operations in envelope

# We are in a Pressure-Cooker!



Denis Papin 1691

- Revitalization of faculty
  - Renewal through retirements
  - CRC program
  - Large increase in no. of graduate students
- Growth areas
  - ATLAS, SNOLAB, ISAC, ...
- The CFI effect
  - New labs, computing and infrastructure
  - No mechanism yet in place for funding long-term operating costs
- Papin invention had a safety valve
  - So far, we have none!

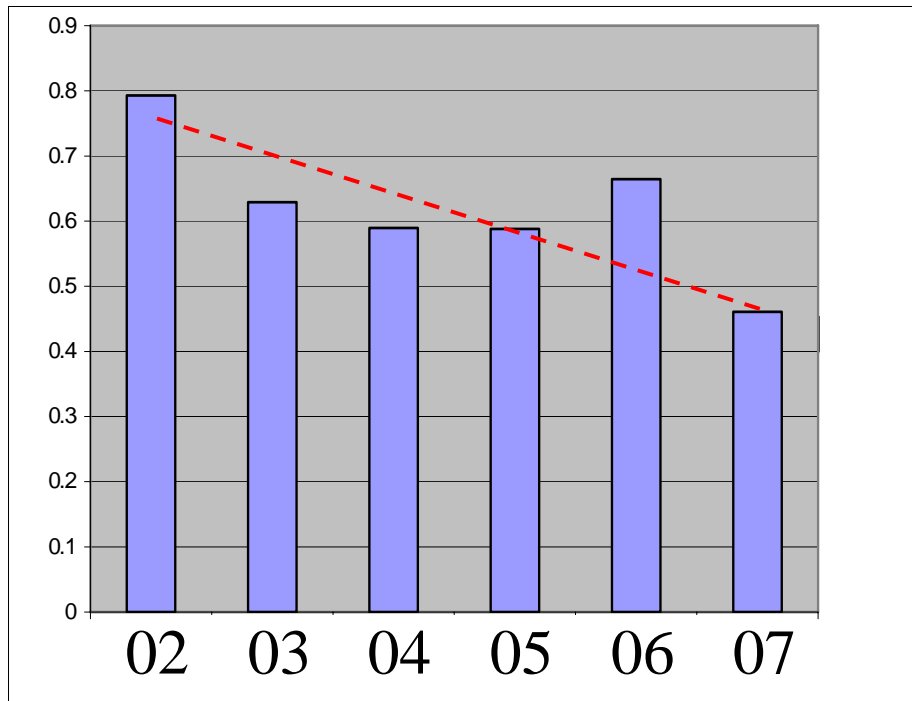
# A Telling Metric

	2002	2003	2004	2005	2006	2007
Envelope	21.1	22	22.4	22.9	22.5	22.3
Requested	17.4	15.1	15.6	15.3	14.9	20.4
Available	13.8	9.5	9.2	9	9.9	9.4
Awarded	13	8.7	8.5	8.8	9.1	
Balance	0.8	0.8	0.7	0.2	0.5	9.4
Available/Requested	0.793103	0.629139	0.589744	0.588235	0.66443	0.460784
Funding Rate	0.747126	0.576159	0.544872	0.575163	0.610738	

Numbers from previous Chair's Reports

All \$M

(for 2005 = 8.3 + 0.7 deferred KOPIO installment)



$$\frac{\text{Funds Available}}{\text{Funds Requested}}$$

# LRP Table 4

- Competition took place in context of the worst scenario in the LRP:

flat funding with SNOLAB operations funds requested within the envelope.

- To quote LRPC chair, Ken Ragan, in 2006:  
 "a crippled Canadian SAP community, unable to exploit even our own world-class facilities."

Year	05/06	06/07	07/08	08/09	09/10	10/11	Σ 06-10	Σ 11-15
<b>Committed Capital</b>								
ATLAS		0.6	0.6	0.0	0.0	0.0	1.3	0.0
ISAC		1.9	2.2	1.6	0.5	0.5	6.8	0.0
T2K		0.6	0.9	0.6	0.0	0.0	2.0	0.0
Breadth		0.2	0.0	0.0	0.0	0.0	0.2	0.0
<b>Subtotal</b>		<b>3.4</b>	<b>3.7</b>	<b>2.2</b>	<b>0.5</b>	<b>0.5</b>	<b>10.3</b>	<b>0.0</b>
<b>New Capital Initiatives</b>								
ATLAS							0.0	
ILC							0.0	5.0
ISAC							0.0	3.0
SNOLab			0.0	1.0	1.0	1.5	3.5	5.0
T2K							0.0	0.0
Breadth							0.0	0.0
<b>Subtotal</b>			<b>0.0</b>	<b>1.0</b>	<b>1.0</b>	<b>1.5</b>	<b>3.5</b>	<b>13.0</b>
<b>Capital Total</b>	<b>4.1</b>	<b>3.4</b>	<b>3.7</b>	<b>3.2</b>	<b>1.5</b>	<b>2.0</b>	<b>13.8</b>	<b>13.0</b>
<b>Experimental Operations</b>	<b>13.0</b>	<b>13.3</b>	<b>11.9</b>	<b>11.0</b>	<b>11.0</b>	<b>11.0</b>	<b>58.2</b>	<b>55.0</b>
Theory	3.0	3.2	3.1	3.0	3.0	2.9	15.1	14.5
MFA/Infrastructure	1.8	1.9	1.7	1.6	1.5	1.5	8.1	7.5
R&D/Instrumentation	0.6	0.5	0.2	0.0	0.0	0.0	1.6	0.0
<b>SNOLab Facility Operations</b>			<b>3.0</b>	<b>5.0</b>	<b>5.0</b>	<b>5.0</b>	<b>18.0</b>	<b>25.0</b>
<b>Expenditures</b>	<b>22.6</b>	<b>22.2</b>	<b>23.5</b>	<b>23.8</b>	<b>22.0</b>	<b>22.4</b>	<b>113.8</b>	<b>115.0</b>
Repayments	-0.6	0.1	-0.1	0.3	0.3	0.3	0.9	0.0
<b>TOTAL</b>	<b>21.9</b>	<b>22.3</b>	<b>23.5</b>	<b>24.1</b>	<b>22.3</b>	<b>22.7</b>	<b>114.7</b>	<b>115.0</b>
Envelope	22.2	22.5	22.8	23.0	23.0	23.0	114.3	115.0
Surplus/Deficit	0.3	0.3	-0.7	-1.1	0.8	0.3	-0.4	0.0
<b>Cumulative Surplus/Deficit</b>	<b>0.4</b>	<b>0.7</b>	<b>0.0</b>	<b>-1.1</b>	<b>-0.3</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>



# GSC-19 2007

Name	Organization	Final Year	
Georges Azuelos	Université de Montréal/TRIUMF	(2008)	
Cliff Burgess	McMaster University/Perimeter Institute	(2007)	
Byron Jennings	TRIUMF	(2008)	
John Martin (Chair)	University of Toronto/IPP	(2007)	
Kumar Sharma	University of Manitoba	(2007)	
Howard Trottier	Simon Fraser University	(2009)	
Cornelius Beausang	University of Richmond	(2007)	
Stéphane Coutu	Pennsylvania State University	(2007)	
Roy Holt	Argonne National Laboratory	(2008)	
Greg Landsberg	Brown University	(2009)	
Karol Lang	University of Texas at Austin	(2008)	chair 2008
Allena Opper	George Washington University	(2007)	

**NSERC** Samir Boughaba Team Leader  
 Michèle Beaudry Program Officer  
 Isabelle Blain Vice-President, Research Grants & Scholarships  
 Jean-Claude Kieffer Group Chair (Director, INRS Énergie,  
 Matériaux et Télécommunications)

# On the job







# Fall Schedule

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- October
  - Referee assignment
    - Chair assigns 1st and 2nd reviewers to F180 submissions; they assign 5 external referees to each request (no conflict of interest)
  - Policy meeting, Victoria (1 day)
  - Site visits to UVic, UBC, SFU, TRIUMF (3 days)
- November
  - Chairs' meeting, Ottawa
    - Review referee assignments
    - Review applications falling between GSCs
      - We requested consultations on 3 requests from GSCs 8, 17
    - Prepare Large Projects Day agenda
    - GSC Structure Review (see below)



# Fall Schedule

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- September – January

- In-depth reviews: expert committees

- Chair or designate attends ex-officio; other GSC members assigned as members

■ TIGRESS	J. Martin	C. Beausang
■ PERIMETER *	B. Jennings	
■ SNO+	J. Martin	K. Lang
■ DEAP	J. Martin	K. Lang
■ SNOLAB Operations	J. Martin	K. Sharma
■ ATLAS	J. Martin	S. Coutu
■ T2K	K. Lang	A. Opper
■ BABAR	K. Lang	A. Opper

- Reports including financial recommendations to GSC

\* funding outside GSC-19 (whew!)

■ ACOT (Dec., May)	J. Martin	
■ SNO (May)	K. Lang	J. Martin, S. Coutu



# Large Projects Day (Feb. 5)

- 7h30 - 8h15 Working Breakfast - Committee *in camera*
- 8h15 - 8h45 Meeting with **IPP** (W. Trischuk) *in camera*
- 8h45 - 9h15 Meeting with **TRIUMF** (J.-M. Poutissou) *in camera*
- 9h15 - 9h45 Meeting with **Perimeter** Institute (H. Burton) *in camera*
  
- 9h45 - 10h00 **COFFEE**
- 10h00 - 11h00 **ATLAS**
- 11h00 - 11h40 **T2K**
- 11h40 - 12h20 **QWeak**
- 12h20 - 13h00 **LUNCH**
- 13h00 - 13h40 **BABAR**
- 13h40 - 14h40 **SNOLAB**
- 14h40 - 15h20 **SNO+**
- 15h20 - 15h40 **COFFEE**
- 15h40 - 16h20 **DEAP**
- 16h20 - 17h00 **EXO**
  
- 17h00 - 17h30 Meeting with representative of **Ontario's MRI** *in camera*
- 17h30 - 18h10 Meeting with Isabelle Blain *in camera*
- 18h10 Committee *in camera*



# Competition Budget (\$M)

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- GSC-19 Base Budget \$20.665M
  - Cumulative increases to envelope
    - Reallocations increment (final year): \$86k
    - New applicants increment: \$117k
      - But, 15 new applicants!
    - MRS increase (6.4% of \$1M): \$64k
  - RTI adjustment: \$46k
    - beginning of competition (see later)
  - Previous commitments \$13.948M
  
- 65 applications totaling \$20.441M
- 2007 budget (see next page): \$9.447M
  - → Projected Funding Rate: 46%

**2007 Competition - Subatomic Physics Envelope Budget**  
**Beginning of Competition**

*(millions of dollars)*

<b>Budget Item</b>	<b>2005-06</b>	<b>2006-07</b>	<b>2007-08</b>	<b>2008-09</b>	<b>2009-10</b>	<b>2010-11</b>	<b>2011-12</b>
<b>Base Budget</b>	20.665	20.665	20.665	20.665	20.665	20.665	20.665
<b>Cumulative Permanent Additions:</b>							
New Applicants <sup>1</sup>	1.250	1.505	1.622	1.622	1.622	1.622	1.622
Reallocations <sup>2</sup>	0.287	0.373	0.459	0.459	0.459	0.459	0.459
Transfers <sup>3</sup>	0.000	0.000	0.064	0.064	0.064	0.064	0.064
<b>Temporary Transfers:</b>							
ATLAS Cost-to-Completion	0.750	0.075	0.075	-0.300	-0.300	-0.300	0.000
SRO Contribution	-0.137	-0.137	0.000	0.000	0.000	0.000	0.000
From other GSCs	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Forward-Borrow	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>Total Fiscal Year</b>	22.933	22.481	22.885	22.510	22.510	22.510	22.810
<b>Actual Spending</b>	22.517	22.433					
<b>Carry-forward</b>	0.416	0.464					
<b>Commitments<sup>4</sup></b>			-13.948	-6.708	-1.550	-0.997	
<b>RTI budget adjustment<sup>5</sup></b>		0.118 *	0.046				
<b>Available for Spring Competition</b>			9.447				

<sup>1</sup> The allocation for new applicants past FY2007 is not known at this time.

<sup>2</sup> FY 2007/08 is the last year for the 2002 reallocations exercise.

<sup>3</sup> \$64,000 were added to the envelope as a result of the \$1M increase to the general MRS budget (6.4%).

<sup>4</sup> Commitments as per February 05, 2007.

<sup>5</sup> The RTI budget adjustment is made using year-end funds. It is continuously adjusted up to the end of March as year-end funds become available.

\* included in Total Fiscal Year 2005-06



# Multiyear Commitments

## MULTIYEAR COMMITMENTS PER CATEGORY **WITH POST-COMPETITION** ADJUSTMENTS January 27, 2007

FISCAL YEAR	2006	2007	2008	2009	2010
EQ - TOTAL <sup>1</sup>	3,772,076	3,363,541	2,482,844	800,000	800,000
THEORY-TOTAL	3,159,830	2,478,250	1,841,000	1,050,000	497,000
EXP OPS - TOTAL	15,501,335	8,106,000	2,683,750	0	0
<b>TOTAL EXPENDITURE</b>	<b>22,433,241</b>	<b>13,947,791</b>	<b>7,007,594</b>	<b>1,850,000</b>	<b>1,297,000</b>

<sup>1</sup> New Equipment for 2006 does not include \$117.4K awarded in the 2006 competition but paid using year end funds of FY2005

EQ: Equipment; EXP OPS: Experimental Operations

Envelope Share	
<b>2006 Competition with Adjustments</b>	
THEORY	14.1%
EQ	16.8%
EXP OPS	69.1%



# The Competition (Feb. 6-10)

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- Round 1

- review each application without regard to overall budget (blind analysis at the GSC!) - **nevertheless an overall severe approach was taken**
  - Reviewers 1 and 2 present independent in-depth reviews and recommendations
    - take account of external reviews and site visit Committee reviews
  - discussion and voting on criteria: excellence of proposal, excellence of researcher(s), contribution to HQP training, need for funds
  - voting on whether to fund; funding duration and level
- two parallel sub-committees for theory, RTI+MRS
- a few “flagged” applications re-discussed at the end
- Ontario MRI representative observed discussion of SNO+ and SNOLAB operations applications
- **then “open the box”:** **we were \$2.0M overspent**



# The Competition

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- review 2008 situation
  - estimate grant levels for renewals in 08 and add to the 08 funds granted in Round 1 and committed in previous years (IN, GP, PJ, MRS)
    - **appeared there would be no funds for new capital**
  - significant contribution to the 07 and 08 problem was a 2-year grant to SNOLAB operations, with 08 funding contingent on matching funding from Ontario
    - **conclude impossible to fund 08 SNOLAB operations**
- review 2007 situation
  - conclude impossible to cut \$2M without severely damaging highly meritorious established research programs
  - nevertheless recognized the necessity to provide operating funding for SNOLAB for 1 year while other funding sources are sought; otherwise serious consequences to start-up plans
  - **after exploring various unpalatable options, take the exceptional decision to forward borrow \$1.2M**





# The Competition

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- Round 2
  - make further cuts to Round 1 recommendations, including to SNOLAB operations, to **remove the remaining \$0.8M deficit for 07** : painful
  - for multi-year grants, these cuts extended to future years as well to ensure adequate funds for new capital ahead
  - procedure took into account the scoring results of Round 1 and the LRP priorities
- Theory Institutes –Main MRS Committee
  - two applications for theory institutes reviewed
  - written recommendations sent to MRS Committee
- DAS program (more later)
  - 3 applications considered and voted on; one put forward to the DAS Committee



# Competition Results

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- Short “B-list” for equipment was funded
  - RTI adjustment increased at year-end (\$46k to \$126K)
- Forward-borrowing: reimburse \$1.2M in 4 equal installments (08-11) to “spread the pain” evenly over the community
- SNOLAB: offers Canada a superb and unique scientific opportunity for the next decade and beyond
  - chance to lead the world in underground physics: DM,  $\beta\beta$  decay, etc
  - recognized with 1-year operations grant
  - Committee’s opinion unanimous that future years must be secured outside GSC-19; irreparable damage to SAP otherwise
- New equipment only \$342k (\$250k predicted from 06 report)
- 2008 budget will be ~ \$6.4M
  - relatively low because no large projects up for renewal
  - should be room for \$4.0+/-0.5M capital (\$2.6M already committed)

**2007 Competition - Subatomic Physics Envelope Budget**  
**End of Competition**

*(millions of dollars)*

<b>Budget Item</b>	<b>2005-06</b>	<b>2006-07</b>	<b>2007-08</b>	<b>2008-09</b>	<b>2009-10</b>	<b>2010-11</b>	<b>2011-12</b>
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From other GSCs	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Forward-Borrow	0.000	0.000	1.200	-0.300	-0.300	-0.300	-0.300
<b>Total Fiscal Year</b>	22.933	22.481	24.211	22.210	22.210	22.210	22.510
<b>Actual Spending</b>	22.517	22.433	24.662				
<b>Carry-forward</b>	0.416	0.464	0.013				
<b>Commitments</b>				15.262	4.825	1.677	0.680
<b>RTI budget adjustment<sup>4</sup></b>		0.118	0.126				

<sup>1</sup> The allocation for new applicants past FY2007 is not known at this time.

<sup>2</sup> FY 2007/08 is the last year for the 2002 reallocations exercise.

<sup>3</sup> \$64,000 were added to the envelope as a result of the \$1M increase to the general MRS budget (6.4%).

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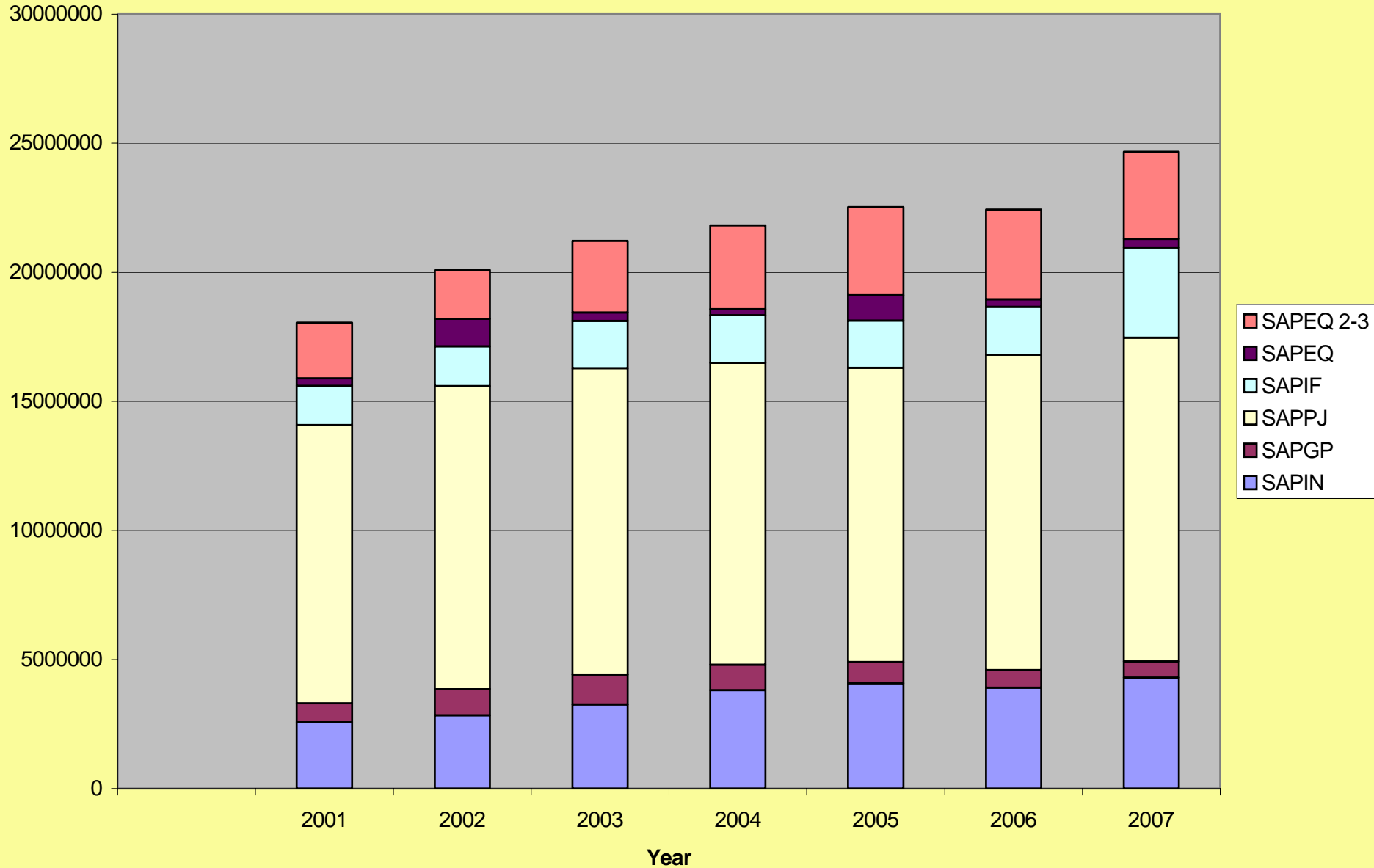
**END OF 2007 COMPETITION  
MULTI-YEAR COMMITMENTS BY CATEGORY**

	2007	2008	2009	2010	2011
EQ - COMMITTED <sup>1</sup>	\$3,363,541	\$2,482,844	\$800,000	\$800,000	
EQ - NEW	\$342,308	\$130,000			
<b>EQ - TOTAL</b>	<b>\$3,705,849</b>	<b>\$2,612,844</b>	<b>\$800,000</b>	<b>\$800,000</b>	
THEORY-COMMITTED	\$2,478,250	\$1,841,000	\$1,050,000	\$497,000	
THEORY - NEW	\$824,000	\$824,000	\$824,000	\$532,000	\$532,000
<b>THEORY - TOTAL</b>	<b>\$3,302,250</b>	<b>\$2,665,000</b>	<b>\$1,874,000</b>	<b>\$1,029,000</b>	<b>\$532,000</b>
EXP OPS - COMMITTED	\$6,374,500	\$2,522,250			
EXP OPS - NEW	\$7,790,000	\$7,157,500	\$2,127,500		
<b>EXP OPS - TOTAL</b>	<b>\$14,164,500</b>	<b>\$9,679,750</b>	<b>\$2,127,500</b>		
MFA/MRS - COMMITTED	\$1,731,500	\$161,500			
MRS - NEW	\$1,758,000	\$443,000	\$323,000	\$148,000	\$148,000
<b>MRS/MFA - TOTAL</b>	<b>\$3,489,500</b>	<b>\$604,500</b>	<b>\$323,000</b>	<b>\$148,000</b>	<b>\$148,000</b>
<b>PAYMENT OF FORWARD BORROW</b>		<b>\$300,000</b>	<b>\$300,000</b>	<b>\$300,000</b>	<b>\$300,000</b>
<b>TOTAL - COMMITTED</b>	<b>\$13,947,791</b>	<b>\$7,007,594</b>	<b>\$1,850,000</b>	<b>\$1,297,000</b>	<b>\$0</b>
<b>TOTAL - NEW</b>	<b>\$10,714,308</b>	<b>\$8,854,500</b>	<b>\$3,574,500</b>	<b>\$980,000</b>	<b>\$980,000</b>
<b>GRAND TOTAL</b>	<b>\$24,662,099</b>	<b>\$15,862,094</b>	<b>\$5,424,500</b>	<b>\$2,277,000</b>	<b>\$980,000</b>
<b>ENVELOPE BY END OF COMPETITION</b>	<b>\$24,675,380</b>	<b>\$22,223,281</b>	<b>\$22,210,000</b>	<b>\$22,210,000</b>	<b>\$22,510,000</b>
<b>AVAILABLE</b>	<b>\$13,281</b>	<b>\$6,361,187</b>	<b>\$16,785,500</b>	<b>\$19,933,000</b>	<b>\$21,530,000</b>

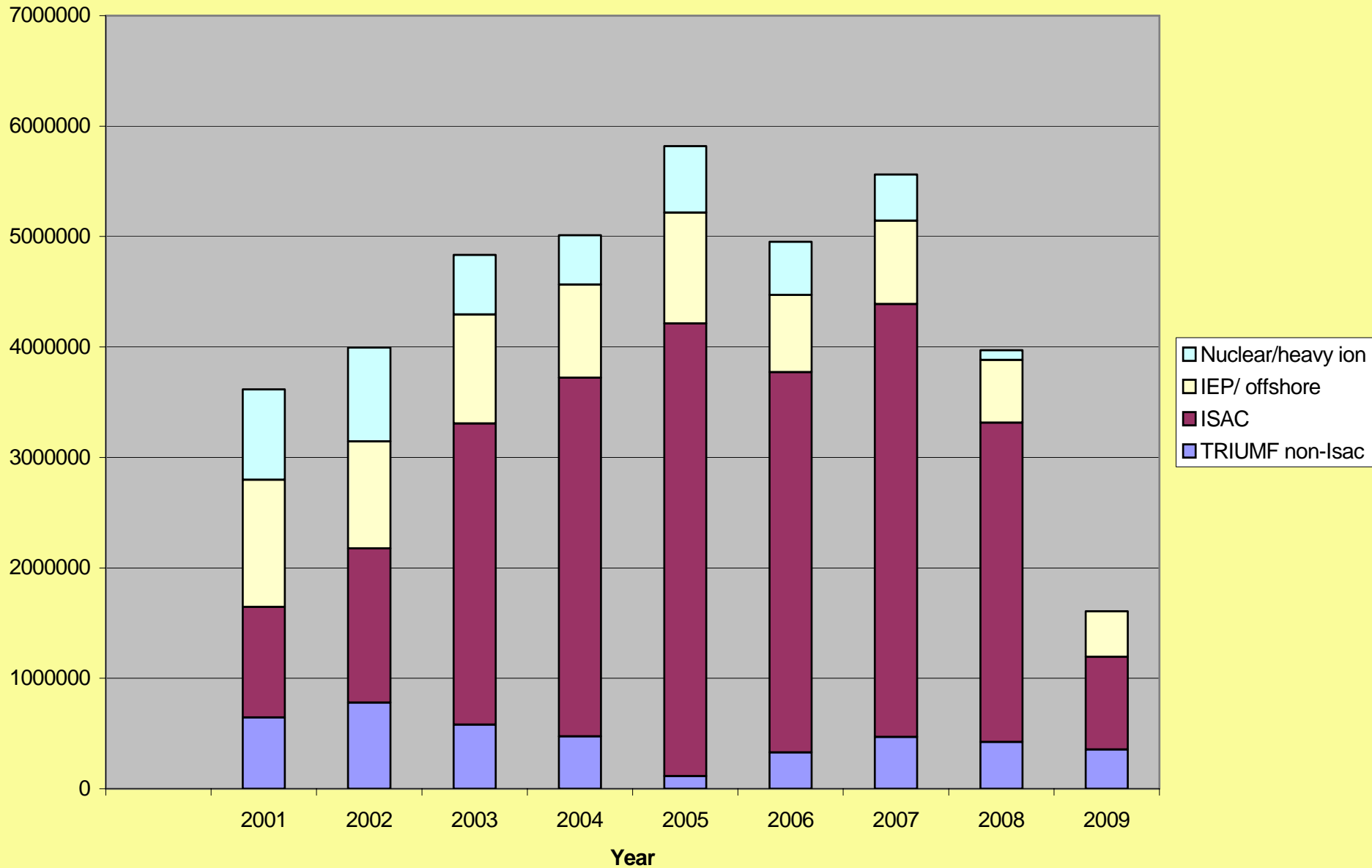
<sup>1</sup> The committed amount for equipment includes the \$300,000 to be paid by the envelope to NSERC's main RTI program as a reimbursement of the payment NSERC made towards ATLAS' Cost-to-Completion.

**Final 2007 Funding Rate: 52.4%**

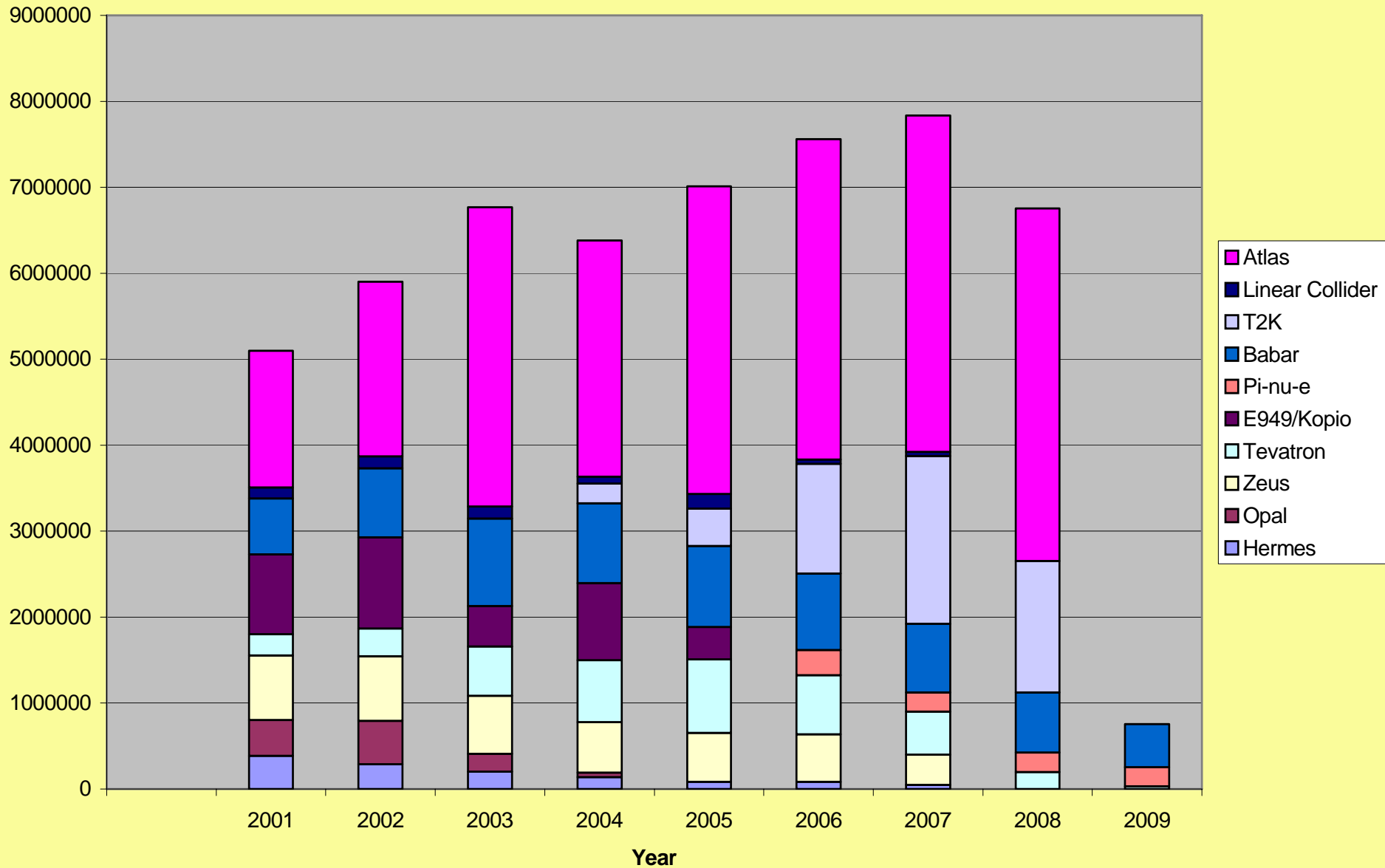
# Awards by Grant Type



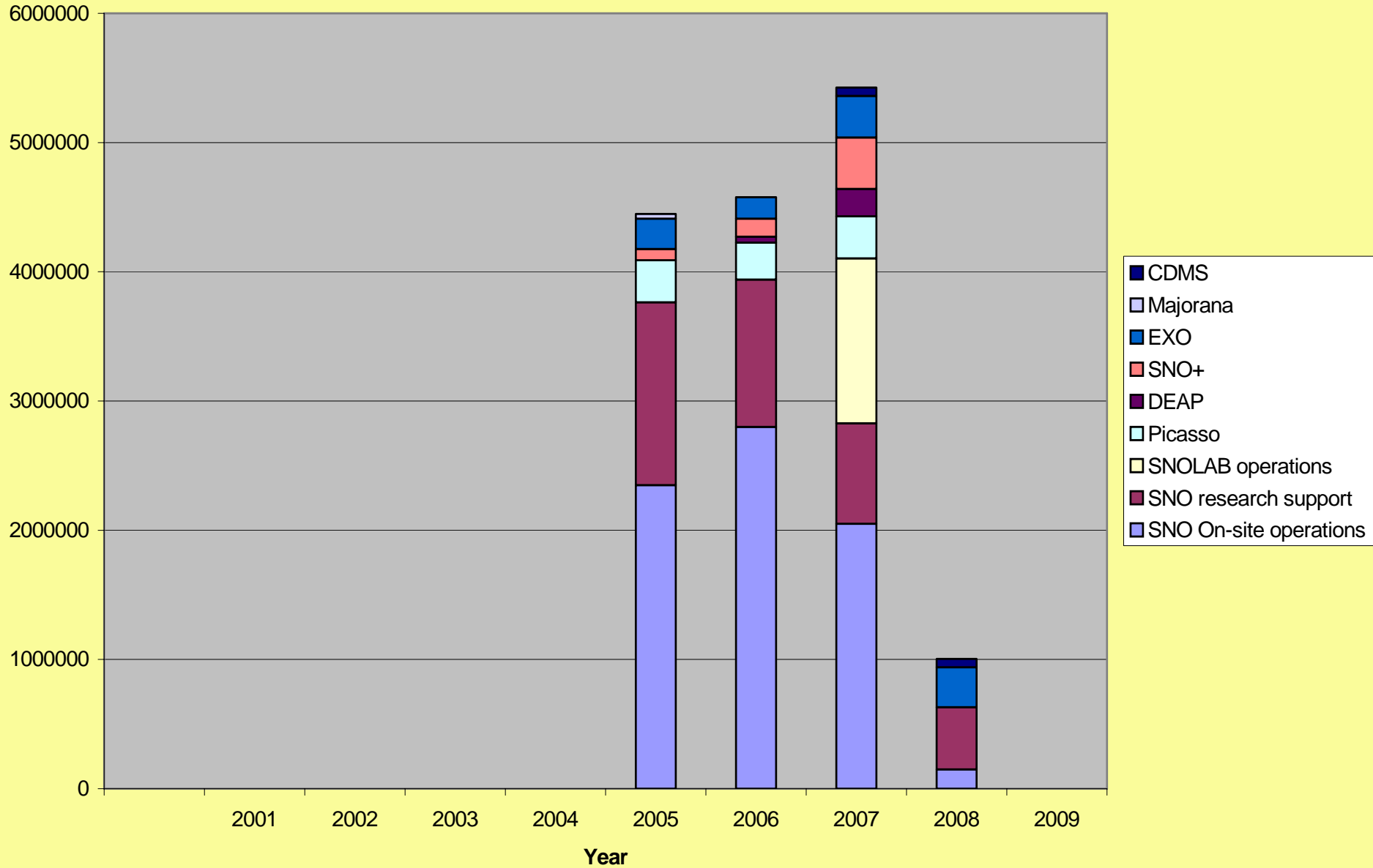
# DNP: Nuclear and IEP



# IPP: Particle Physics

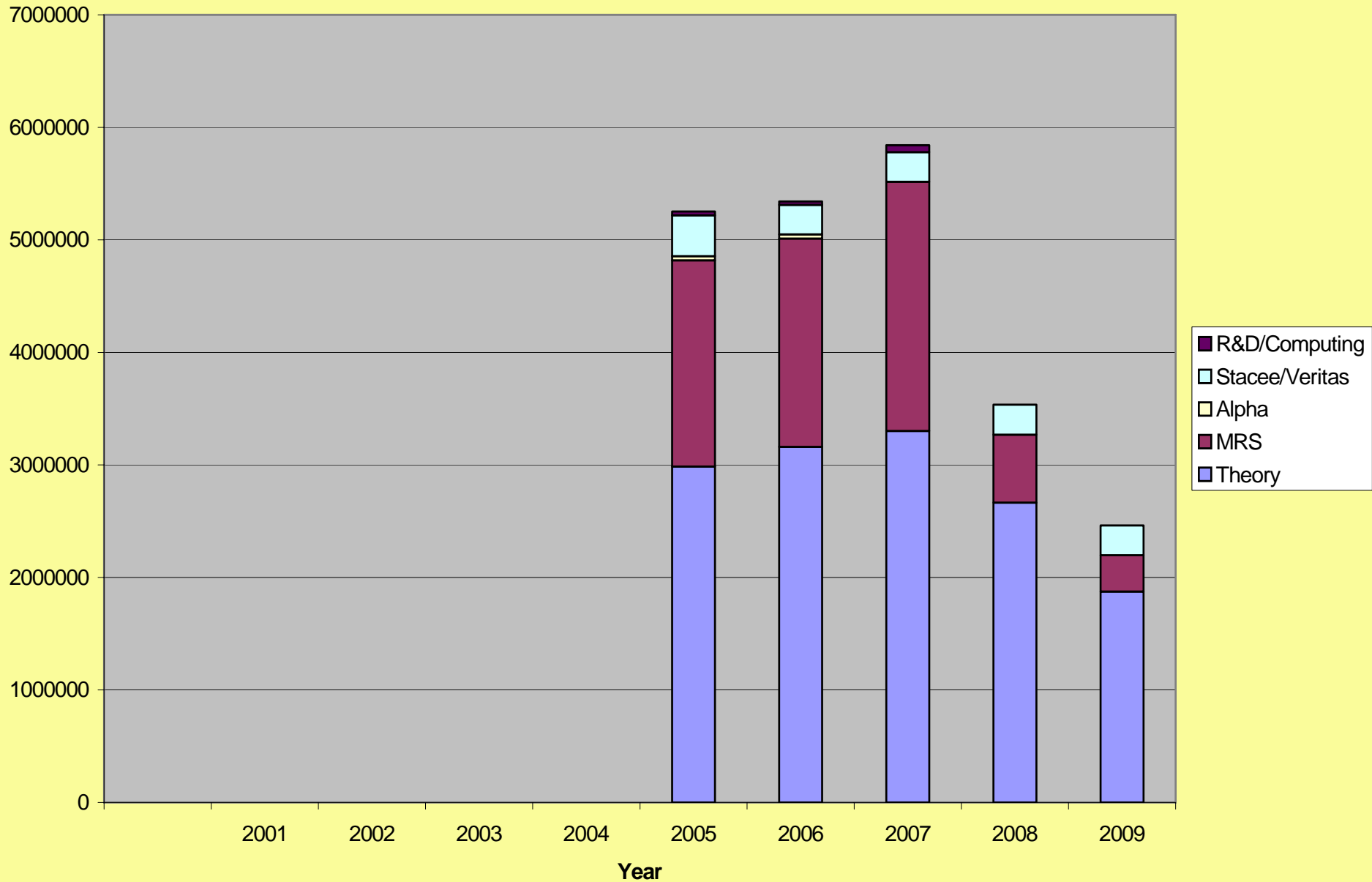


# SNOLAB





# Theory, MRS, Other



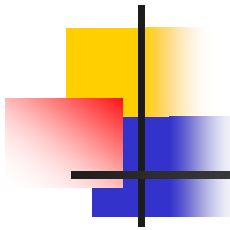


# Theory

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- End of reallocation period, appropriate time to review – thanks to Cliff Burgess!
  - Theory has increased from 11% to 14.1%\* of envelope since 2002 (\$2.35M to \$3.30M)
    - intended, since half of the reallocations funds (\$1.845M) were earmarked “to strengthen SAP theory”
    - has rescued SAP theory from the crisis of the mid-late 90s – at that time, e.g., could not compete with USA to hire top postdocs
  - since 1996: \$1.76M to \$3.30M (88%)
    - no. of funded theorists has increased by 10%
    - average grant has increased from \$25.8k to \$44.0k (70%)
    - first quartile increased 29%, third quartile 96% - we are funding excellence preferentially

\* excluded \$1.2M forward borrowing in 2007

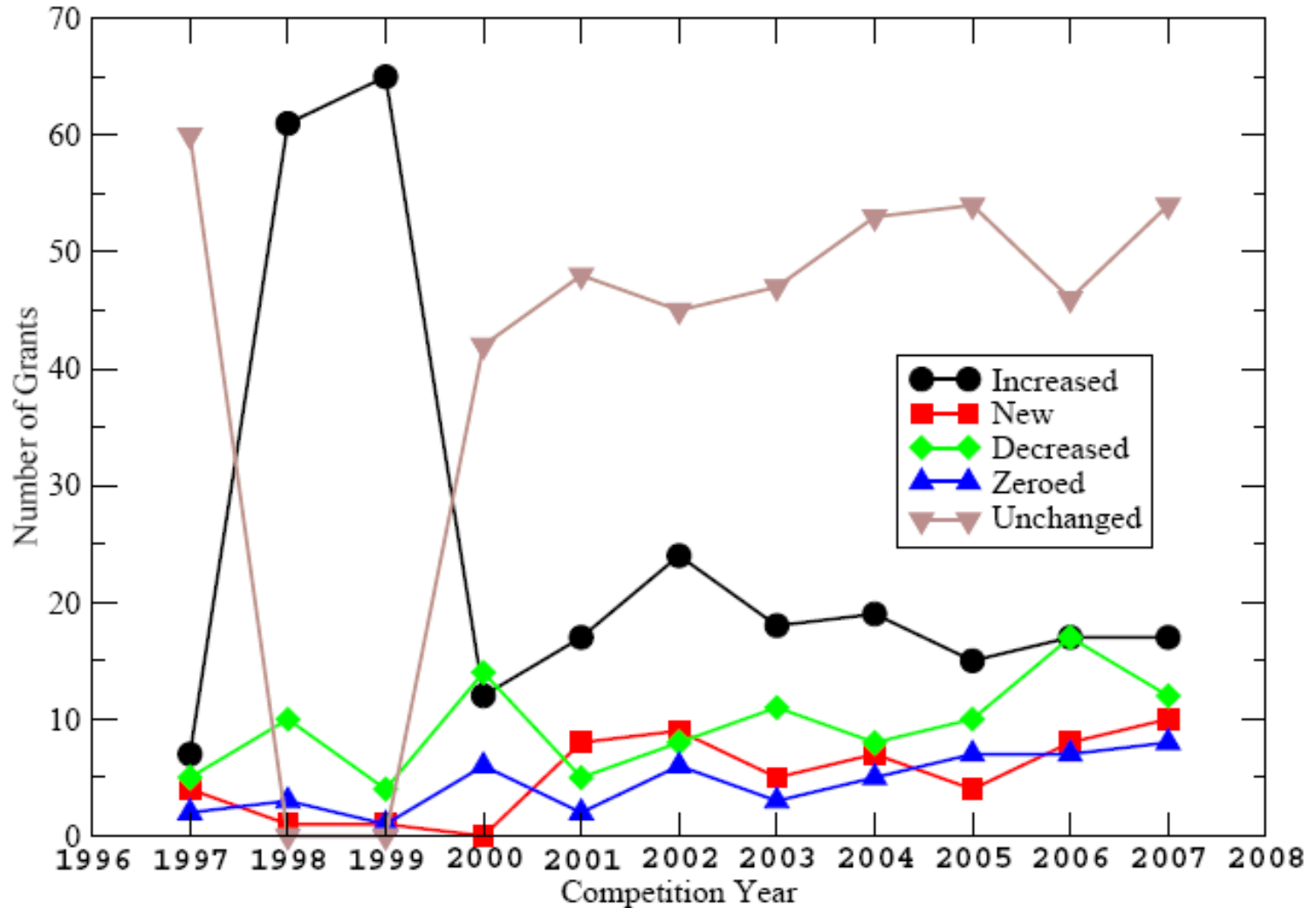


# Theory: 12-year details

Year	Funded	Total	1st Q	Median	3rd Q	Max	Average
1996	68	1,755,700	17,000	27,000	35,700	53,000	25,819
1997	70	1,744,100	15,000	24,100	35,000	53,000	24,916
1998	68	1,837,440	16,500	26,400	38,500	58,300	27,021
1999	68	1,972,501	17,325	28,875	40,950	57,750	29,007
2000	62	1,920,475	19,635	32,340	42,000	60,000	30,975
2001	68	2,158,285	20,000	33,000	42,000	60,000	31,739
2002	71	2,347,134	22,000	34,125	45,000	62,000	33,058
2003	73	2,619,784	24,000	38,000	47,000	75,000	35,887
2004	75	2,898,684	24,000	40,000	50,000	85,000	38,649
2005	72	2,985,484	24,000	40,000	60,000	85,000	41,465
2006	73	3,159,830	25,000	45,000	63,000	85,000	43,285
2007	75	3,302,250	22,000	45,000	70,000	85,000	44,030
96-07	(+10%)	(+88%)	(+29%)	(+66%)	(+96%)	(+60%)	(+70%)

# Theory

## Number of Changed Grants By Year

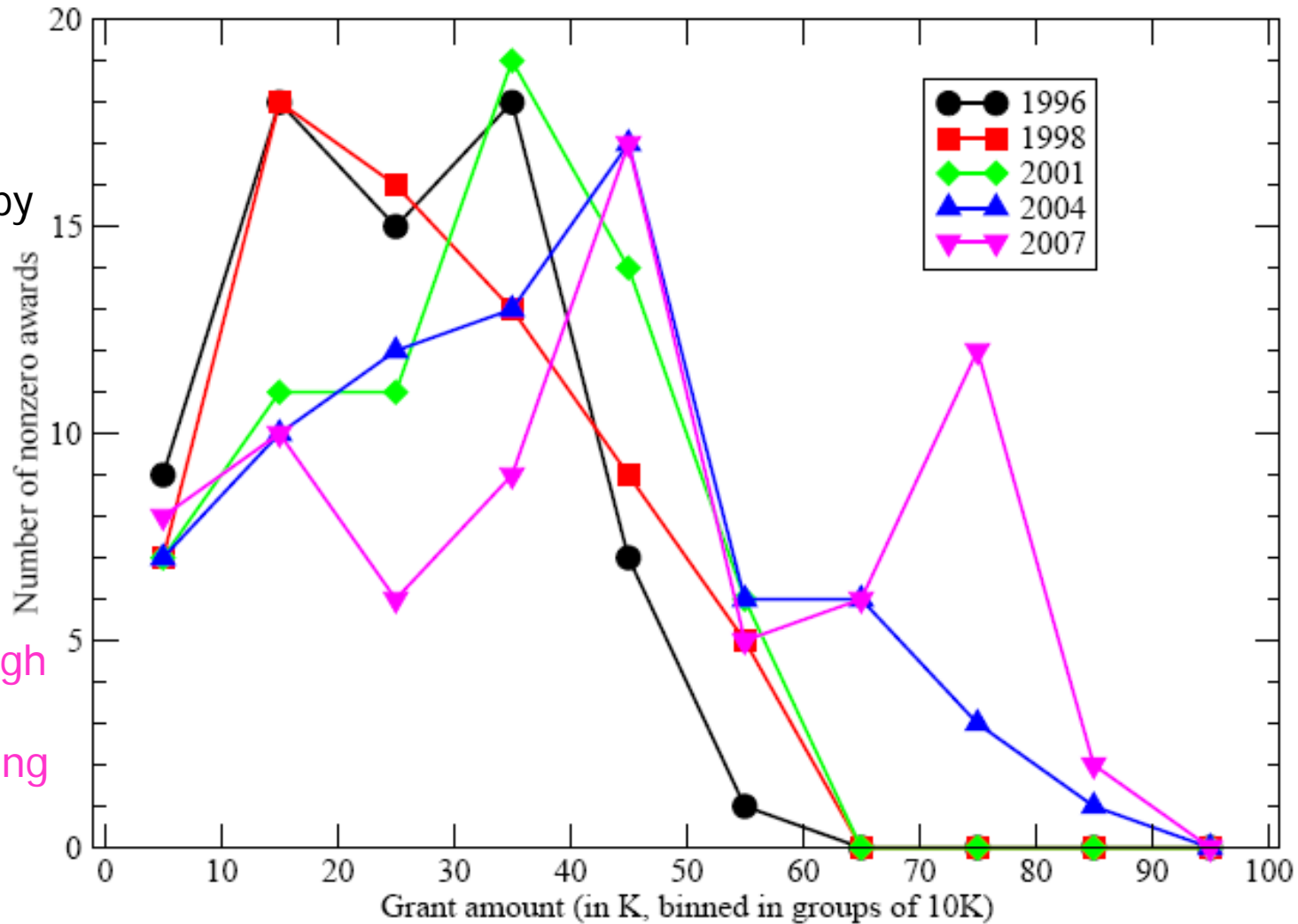


spike in 98-99  
due to overall  
percentage  
increase

# Theory

## Histogram of Award Sizes

Nonzero awards only



1996: dominated by low grants

2007: a peak at high grant level has developed: awarding excellence, and it includes several young theorists



# Policy Matters

- SAP-MRS Awards

- concern that this support is declining due to the other pressures on the envelope
- find ways to collaborate and share the distributed resource of personnel (actually one of the NSERC criteria)

- RTI Funding

- **we penalize ourselves** if significant capital requests are included in project grant applications
- NSERC makes an RTI adjustment to the envelope (upwards in most years) – the formula has as a multiplier the total amount of RTI requests in the GSC-19 competition

$$\left[ \left( \frac{RTI \text{ funds}}{\sum RTI \text{ requested}} \right)_{\text{outside GSC19}} - (Funding Rate)_{\text{base}} \right] \times \sum_{GSC19} RTI \text{ requested}$$

- **please submit major capital requests in RTI applications !!**



# Policy Matters

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- NSERC Review of Discovery Grants Program
  - Industry Canada has reviewed the Granting Councils: basically favourable, but concerns about NSERC's "high success rate, low average grant, challenge of supporting the best at international level"
    - → fall 2007 review by distinguished international committee – input from universities, grant holders and students
  
- GSC Structure Review in progress
  - does the current structure manage well the evolution of disciplines, increasing numbers of researchers, boundaries between research areas, new fields, etc, etc ?
  - consultation with community important, e.g., here at CAP
  - changes will be implemented in 2009 or 2010 competition
    - GSC-19 likely to be minimally affected (?)
    - we should make sure our envelope structure is preserved



# Policy Matters

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- Discovery Accelerator Supplements (DAS)
  - aimed at researchers who have a significant program but are being held back by insufficient funding
  - \$120k over 3 years
  - competition is multidisciplinary outside GSC-19
  - only individual and group grants – GSC-19 was disadvantaged in 2007
  - from next year: collaborations submitting project grants may identify an individual or group for DAS - they would submit a separate application linked to the project application
  - individuals joining projects can only submit an individual grant if the year is out of phase with the project renewal
- Fall Site Visits
  - decision to continue; GSC-19 considers them valuable
  - October 2007: Ontario, Quebec and, for the first time, the Maritimes





# Closing Remarks

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- SAP Resources
  - our community is vibrant and our field holds great promise – unfortunately, we are funding meritorious research inadequately
  - every effort needs to be made to secure SNOLAB operating funds – the huge CFI investment must be followed by a strong scientific program
  - even then it will be very difficult to fund the capital for SNOLAB experiments, an ILC experiment, ATLAS/ISAC/T2K upgrades, etc
- **We need to sell the implementation of Table 1 (not Table 4!) of the LRP**