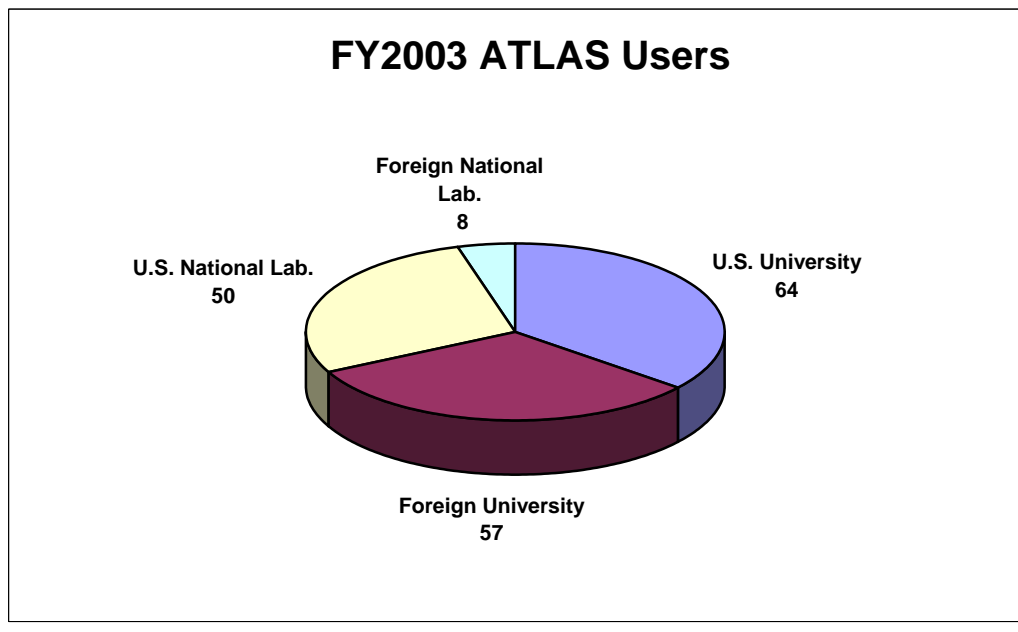


I. ATLAS USER PROGRAM

E. F. Moore

During the Fiscal Year 2003, ATLAS hosted strong “campaigns” involving radioactive beams, the CPT, the super-heavy element program, as well the AMS program. In addition, Gammasphere returned to ATLAS and became operational in March 2003. Many of the experimental programs were driven by outside Users, and in all programs, there was considerable outside User involvement. Over 95% of all experiments performed in Fiscal Year 2003 included one or more outside Users and roughly 50% of the approved experiments had an outside User as the Principal Investigator. Frank Moore continued to be available in a user liaison capacity to handle the scheduling of ATLAS experiments, provide assistance in experiment proposal submission matters, and help facilitate the effective performance of research at ATLAS by outside scientists. In addition, a large portion of the Heavy-Ion in-house scientific staff and members of the technical support staff spent time in experiment setup, preparation and assistance for the many different experiments performed at ATLAS.

A total of 179 Users from 60 different institutions were present at ATLAS for experiments in Fiscal Year 2003. The pie chart below shows the distribution of the institutions represented by ATLAS Users and the number of Users of each type. Of the 50 Users from U.S. National Laboratories, 32 are from Argonne (27 from the Physics Division, 5 from other divisions). There were 51 students at ATLAS for experiments this Fiscal Year, of which 11 were based at Argonne long-term. The names and institutions of all outside Users who were present at ATLAS in Fiscal Year 2003 are listed below in section (b).



The Program Advisory Committee met twice during the Fiscal Year 2003, on February 7-8, 2003 and September 19-20, 2003 to recommend experiments for beam time allocation at ATLAS. In Fiscal Year 2003 the Program Advisory Committee members were:

February 7-8, 2003

Art Champagne
 Jolie Cizewski
 Stuart Freedman
 Augusto Macchiavelli
 David Morrissey

University of North Carolina, Chapel Hill
 Rutgers University
 University of California
 Lawrence Berkeley National Laboratory
 Michigan State University

David Radford (*Chair*)
Piet Van Duppen
Alan Wuosmaa

Oak Ridge National Laboratory
University of Leuven, Belgium
Argonne National Laboratory

September 19-20, 2003

Birger Back
Art Champagne
Jolie Cizewski
Augusto Macchiavelli
David Morrissey
David Radford (*Chair*)
Piet Van Duppen
Alan Wuosmaa

Argonne National Laboratory
University of North Carolina, Chapel Hill
Rutgers University
Lawrence Berkeley National Laboratory
Michigan State University
Oak Ridge National Laboratory
University of Leuven, Belgium
Western Michigan University

The PAC reviewed 54 proposals for 339 days of requested running time at the February meeting, and 50 proposals for 294 days at the September meeting. Due to the reduction of available beam time with 5 day/week operation for the first half of the FY and the large demand for Gammasphere beam time, the PAC was asked to prioritize experiments into two categories; those that must be run at any cost (*Priority I*), and those that should be granted beam time if at all possible (*Priority II*). Of the submitted proposals for the two meetings, the Program Advisory Committee recommended Priority I acceptance of 57 proposals for a total of 289 days of running time, and Priority II acceptance of 9 proposals for 55 additional days of beam time.

The fall meeting of the American Physical Society, Division of Nuclear Physics was held in Tucson, AZ, from October 29-November 1, 2003. The US national nuclear laboratories with low energy heavy ion facilities; ATLAS at Argonne, HRIBF at Oak Ridge, and the NSCL at Michigan States University held a joint User Meeting. In addition, the Gammasphere and RIA User groups meetings were also held during the same session. The Chair of the ATLAS User Group Executive Committee, Prof. Alan Wuosmaa (W. Michigan Univ.) introduced the ATLAS user program, and Frank Moore, Zheng-Tien Lu, and Alan Wuosmaa presented an overview of the ATLAS facility and some elements of the current physics program. Mike Carpenter discussed the status of Gammasphere at ATLAS during the Gammasphere Users group session. There were approximately 100 scientists in attendance at the meeting.

In Fiscal Year 2003 the ATLAS Executive Committee consisted of Alan Wuosmaa (Western Michigan University) as Chairperson, Jolie Cizewski (Rutgers University), Susan Fischer (De Paul University), and Walter Reviol (Washington University).

a. Experiments Involving Outside Users

All experiments in which outside users directly participated during Fiscal Year 2003 are listed below. The spokesperson for each experiment is given in square brackets after the title, and the collaborators who were present for the experiment are given below each entry.

1. Test of New FMA Focal Plane Microchannel Plate Detector [Lister]
C. J. Lister, S. M. Fischer, G. Mukherjee, N. Hammond, J. Amann, S. Sinha, R. V. F. Janssens, E. F. Moore, S. J. Freeman
2. Test of the RIA Gas Cell Prototype [G. Savard]
G. Savard, J. A. Clark, J. Vaz, C. Boudreau, A. Heinz, D. Seweryniak, J. C. Wang, K. S. Sharma, W. Trimble, B. Blank, A. Levand, R. C. Pardo, K. E. Rehm, J. P. Greene, D. J. Henderson, E. F. Moore, Z. Zhou

3. Measurement of Helium-3 to Helium-4 Ratios in Isotopically Purified Helium [Doyle]
R. C. Pardo, K. E. Rehm, A. Heinz, C. L. Jiang, J. P. Schiffer, R. V. F. Janssens, R. C. Vondrasek, R. Scott, D. P. Moehs, P. R. Huffman, S. Sinha
4. Proton Decay of ^{121}Pr and ^{125}Pm [Davids]
C. N. Davids, P. J. Woods, D. Seweryniak, J. Shergur, A. Heinz, A. Woehr, A. P. Robinson, P. S. Munro, G. Mukherjee, B. Blank, S. Sinha
5. Investigation of the Ionization Density Limit of a Large Accelerated Gas Cell System [Savard]
G. Savard, J. A. Clark, A. Levand, Z. Zhou, J. C. Wang, W. Trimble, M. Portillo, J. Vaz, B. Blank, L. Blomeley, D. J. Peng, D. Mackay, J. J. Letcher
6. The Proton Decay of the $T_z = -1/2$ "Waiting Point" Nucleus ^{69}Br [Seweryniak]
D. Seweryniak, G. Mukherjee, B. Blank, C. N. Davids, N. Hammond, M. P. Carpenter, S. Sinha, T. Pennington
7. Developing an AMS Detection Method for ^{85}Kr [Collon]
P. Collon, C. L. Jiang, D. J. Henderson, W. Kutschera, R. C. Pardo, Paul, K. E. Rehm, R. Scott, R. C. Vondrasek, G. Zinkann, C. Vockenhuber
8. Continuation of the Mass Measurement Program Along the $N=Z$ Line With the CPT Mass Spectrometer: Completion of the Mass 68 Measurements [Savard]
G. Savard, K. S. Sharma, J. A. Clark, J. C. Wang, Z. Zhou, J. Vaz, M. Froese, L. Blomeley, T. Cocolios, A. Heinz, D. Seweryniak, Lascar, B. Blank, J. E. Crawford, W. Trimble, A. Levand
9. Nucleosynthesis Chronometer ^{182}Hf : Detection by Accelerator Mass Spectrometry [Paul]
M. Paul, C. Vockenhuber, W. Kutschera, P. Collon, K. E. Rehm, R. C. Pardo, R. Scott, R. C. Vondrasek, D. J. Henderson, I. Ahmad, S. Sinha, G. Mukherjee, J. P. Greene
10. Low Spin States of $^{111,113}\text{Sb}$: Where the Shell Model Meets the Interacting Boson-Fermion Model [Shergur]
D. Seweryniak, J. Shergur, W. B. Walters, S. Sinha, C. N. Davids, G. Mukherjee, P. S. Boutachkov, A. R. Teymurazyan, A. Woehr, B. Truett, I. Dillmann
11. Heavy-Ion Irradiation Studies on Single Crystals of the 40K Superconductor MgB_2 [Kwok]
W. Kwok, L. Paulius, L. Undreiu, H. Ryde
12. Coulomb Excitation of the $K^\pi=16^+$ Isomer in ^{178}Hf [Hayes]
A. Hayes, D. Cline, H. Hua, R. Teng, C. Y. Wu
13. Further Measurements for the Unexpected Behavior of Heavy-Ion Fusion Cross Sections at Extreme Sub-Barrier Energies [Jiang]
C. L. Jiang, R. V. F. Janssens, K. E. Rehm, M. Paul, P. Collon, S. Sinha, G. Mukherjee, Z. Zhou, C. N. Davids, D. Seweryniak
14. Assessing the Feasibility of Multiple Proton Emission for Neutron-Rich Isotope Production: Shell Effects in fp-Shell Nuclei [Freeman]
S. J. Freeman, R. V. F. Janssens, C. J. Lister, N. Hammond, M. P. Carpenter, T. Pennington, D. J. Henderson, D. Seweryniak, E. F. Moore, S. M. Fischer
15. Study of the $^8\text{B}(\alpha,p)^{11}\text{C}$ Reaction [Rehm]
C. L. Jiang, K. E. Rehm, R. H. Siemssen, A. H. Wuosmaa, S. Sinha, R. V. F. Janssens, R. C. Pardo, E. F. Moore, J. P. Schiffer, J. P. Greene, D. J. Henderson, T. Pennington, R. E. Segel, L. Jisonna

16. Study of the Breakout From the Hot CNO Cycle to the (rp) Process via the $^{18}\text{Ne}(\alpha,p)^{21}\text{Na}$ Reaction [Segel]
R. E. Segel, L. Jisonna, C. L. Jiang, S. Sinha, G. Mukherjee, R. V. F. Janssens, R. C. Pardo, E. F. Moore, J. P. Greene, D. J. Henderson, T. Pennington, J. P. Schiffer, A. H. Wuosmaa, K. E. Rehm, S. Artemov, A. Chen
17. K-Isomers in Neutron-Rich $^{183,184}\text{Hf}$ [Chowdhury]
P. Chowdhury, G. Mukherjee, C. J. Lister, D. Seweryniak, R. V. F. Janssens, T. L. Khoo, C. N. Davids, E. Ngijoi-Yogo, T. Pennington, D. J. Henderson, S. Sinha, M. P. Carpenter
18. Precision Measurement of the Q-Value of the Superallowed Decay of ^{22}Mg With the CPT Mass Spectrometer [Savard]
G. Savard, J. A. Clark, K. S. Sharma, J. C. Hardy, Z. Zhou, J. C. Wang, A. Levand, W. Trimble, N. Scielzo
19. Silver Ion Implantation in Silicon Carbide [MacLean]
H. MacLean, R. C. Pardo, R. C. Vondrasek, R. Scott
20. Identification of the Astrophysical Resonance in the $^{19}\text{Ne}(p,\gamma)^{20}\text{Na}$ Reaction [Woods]
P. J. Woods, D. Seweryniak, C. N. Davids, Z. Liu, T. Davinson, G. Mukherjee, M. P. Carpenter, R. V. F. Janssens, K. E. Rehm, S. Sinha, B. Blank, J. Shergur, C. J. Lister
21. Heavy Recoil Ion Test of an Upgraded MWPC for Nano- to Pico-Barn Cross-Section Experiments II [Pennington]
T. Pennington, C. J. Lister, D. Seweryniak, G. Mukherjee, D. J. Henderson
22. First Identification of Isobaric Analogue States in the Odd-Odd $N = Z - 2$ Nucleus ^{48}Mn [Chandler]
C. Chandler, M. A. Bentley, N. Hammond, J. Ekman, P. Garrett, S. J. Freeman, M. P. Carpenter, R. V. F. Janssens, D. Seweryniak, R. K. G. du Rietz
23. Yrast Structure of Neutron-Rich $N = 30-34$ Nuclei - Search for the Shell Gap at $N = 34$ [Fornal]
B. Fornal, R. J. Broda, W. A. Krolas, Z. W. Grabowski, S. N. Liddick, E. F. Moore, M. P. Carpenter, N. Hammond, S. J. Freeman, G. Mukherjee, T. Lauritsen, C. J. Lister, F. G. Kondev, R. V. F. Janssens, P. J. Daly, D. Seweryniak, B. E. Tomlin, T. S. Pawlat, J. Wrzesinski
24. Study of Excited States in ^7He [Wuosmaa]
A. H. Wuosmaa, K. E. Rehm, J. P. Schiffer, R. C. Pardo, S. Sinha, C. L. Jiang, E. F. Moore, J. P. Greene, R. V. F. Janssens
25. Recoil-Decay Tagging Study of the Near-Spherical Odd-Odd Proton Emitter ^{146}Tm [Davids]
C. N. Davids, D. Seweryniak, A. Sonzogni, G. Mukherjee, B. Blank, W. B. Walters, P. J. Woods, A. P. Robinson, T. Davinson, C. L. Scholey, J. Shergur, N. Hoteling, M. Liu, T. L. Khoo, S. J. Freeman, M. P. Carpenter, R. V. F. Janssens, N. Hammond
26. Cross Section of the $^{62}\text{Ni}(n,\gamma)^{63}\text{Ni}$ Reaction at Stellar Temperatures [Paul]
M. Paul, K. E. Rehm, R. C. Pardo, R. C. Vondrasek, R. Scott, J. P. Greene, I. Ahmad, S. Sinha, G. Mukherjee, C. L. Jiang, H. Nassar, R. Reifarh, X. Tang, T. Pennington
27. Lifetimes and Rotational Alignments in $^{72,73}\text{Kr}$: A Test of Pairing Correlations in $N \sim Z$ Nuclei [Svensson]
C. E. Svensson, R. Wadsworth, C. Andreoiu, F. Johnston-Theasby, P. Joshi, D. G. Jenkins, A. O. Macchiavelli, D. Ward, R. A. Austin, M. B. Smith, D. G. Sarantites, W. Reviol, A. Goergen, P. Garrett, M. P. Carpenter, D. Seweryniak, E. F. Moore, C. J. Lister, S. J. Freeman, G. Mukherjee
28. Identification of Wobbling Modes and Linking Transitions of TSD Bands in ^{174}Hf [Hartley]
D. J. Hartley, L. L. Riedinger, C. R. Bingham, M. K. Djongolov, T. Goon, M. T. Danchev, R. V. F. Janssens, F. G. Kondev, M. P. Carpenter, T. Lauritsen, M. A. Riley, G. D. Dracoulis, G. Sletten, R. A. Kaye, R. W. Laird, S. K. Tandel, E. Ngijoi-Yogo, A. J. Larabee, A. L. Aguilar, B. McClain, O. Grubor-Urosevic, E. F. Moore, G. Mukherjee

29. Measurement of the Beta-Delayed Alpha Spectrum of ^{16}N With a New Technique [Rehm]
K. E. Rehm, A. H. Wuosmaa, C. L. Jiang, S. Sinha, G. Mukherjee, J. P. Schiffer, R. C. Pardo, E. F. Moore, R. E. Segel, L. Jisonna, X. Tang, G. Savard, J. P. Greene, D. J. Henderson
30. The Spin of the 2.643 MeV State in ^{20}Na [Rehm]
K. E. Rehm, J. P. Greene, D. J. Henderson, C. L. Jiang, G. Mukherjee, R. C. Pardo, T. Pennington, J. P. Schiffer, D. Seweryniak, S. Sinha, R. E. Segel, A. H. Wuosmaa, L. Jisonna, R. V. F. Janssens
31. Deformation Effects in Neutron-Rich A~60 Nuclei [Freeman]
S. J. Freeman, C. J. Lister, R. V. F. Janssens, M. P. Carpenter, D. Seweryniak, G. Mukherjee, N. Hammond, D. J. Henderson, T. Pennington, B. J. Varley, J. F. Smith, M. Whitehead
32. Mass Measurements at the Proposed Termination of the rp-Process Path [Savard]
G. Savard, J. A. Clark, Z. Zhou, J. C. Wang, W. Trimble, A. Levand, B. Blank, D. Seweryniak, S. Gulick, D. Mackay, S. R. Batchelor, L. Blomeley, D. J. Peng, J. J. Letcher
33. Finding the Oblate Excited States in ^{72}Kr [Fischer]
S. M. Fischer, C. J. Lister, S. J. Freeman, N. Hammond, G. Mukherjee, S. Sinha, T. Pennington, D. J. Henderson, R. V. F. Janssens, M. P. Carpenter, D. Seweryniak, D. P. Balamuth, P. A. Hausladen, E. F. Moore
34. Study of ^{69}Br via the Beta Decay of ^{69}Kr [Blank]
B. Blank, C. N. Davids, S. J. Freeman, C. J. Lister, G. Savard, D. Seweryniak, G. Mukherjee, K. E. Rehm, J. Shergur, S. Sinha
35. ^{254}No at High Spin and its Angular Momentum Limits [Khoo]
T. L. Khoo, D. Seweryniak, I. Ahmad, B. Blank, M. P. Carpenter, C. N. Davids, S. Sinha, S. J. Freeman, J. P. Greene, N. Hammond, R. V. F. Janssens, F. G. Kondev, T. Lauritsen, C. J. Lister, G. Mukherjee, P. Reiter, A. Heinz, P. Chowdhury, M. S. Johnson, J. Shergur, R-D. K. Herzberg, P. J. C. Ikin
36. Shape Co-Existence Beyond Mid-Shell in ^{181}Tl and ^{181}Pb [Carpenter]
M. P. Carpenter, F. G. Kondev, R. V. F. Janssens, C. J. Lister, S. J. Freeman, G. Mukherjee, D. Seweryniak, E. F. Moore, C. N. Davids, S. Sinha, A. J. Larabee, D. G. Jenkins, P. M. Raddon, R. Wadsworth, S. M. Fischer
37. Structure and Properties of Multi-Quasiparticle Isomers in $^{176,177}\text{Lu}$ [Kondev]
G. D. Dracoulis, A. P. Byrne, G. J. Lane, T. Kibedi, F. G. Kondev, I. Ahmad, M. P. Carpenter, P. Chowdhury, J. P. Greene, N. Hammond, R. V. F. Janssens, T. L. Khoo, T. Lauritsen, C. J. Lister, G. Mukherjee, S. Tandel, C. Wilson, R. L. Gramer
38. Radiative Capture and Fusion Dynamics in Cold Fusion $^{90}\text{Zr} + ^{89}\text{Y}$ Reaction [Kondev]
F. G. Kondev, A. Bracco, F. Camera, O. Wieland, M. P. Carpenter, T. L. Khoo, R. V. F. Janssens, C. J. Lister, I. Ahmad, C. N. Davids, S. J. Freeman, N. Hammond, T. Lauritsen, G. Mukherjee, D. Seweryniak, D. J. Hartley, T. Goon, P. Chowdhury, U. Garg, S. Zhu, E. F. Moore
39. In-Beam Spectroscopy of the Proton Emitter ^{145}Tm [Seweryniak]
D. Seweryniak, A. P. Robinson, Z. Liu, T. Davinson, P. J. Woods, C. Scholey, A. Sonzogni, C. N. Davids, G. Mukherjee, N. Hammond, T. Lauritsen, C. J. Lister, R. V. F. Janssens, T. L. Khoo, S. J. Freeman
40. Investigation of Possible Wobbling Mode in ^{163}Tm [Garg]
U. Garg, S. Zhu, T. Li, X. Wang, G. Mukherjee, S. Sinha, N. Hammond, E. F. Moore, D. Seweryniak, M. P. Carpenter, R. V. F. Janssens, T. Lauritsen

- 41. Very Extended and Hyperdeformed Nuclear Shapes in A~110 Sn and Cd Nuclei [Fallon]
P. Fallon, A. O. Macchiavelli, I. Y. Lee, M. Cromaz, M. A. Riley, B. Herskind, S. W. Odegaard, A. H. Mahmud, M. Descovich, E. Rodriguez-Vieitez, M. P. Carpenter, R. V. F. Janssens, C. J. Lister, N. Hammond, D. Seweryniak
- 42. Chirality Exploration: ¹⁰²Rh [Fossan]
D. B. Fossan, R. Wadsworth, P. Joshi, E. Paul, G. Rainovski, S. Finnigan, T. Koike, K. Starosta, C. Vaman
- 43. Directional Studies of Ion Irradiation Induced Suppression of Superconductivity in MgB₂ [Karapetrov]
G. Karapetrov, W. Kwok, L. Paulius
- 44. Gammasphere Test Run [Carpenter]
M. P. Carpenter, R. V. F. Janssens, C. J. Lister, G. Mukherjee, S. J. Freeman, N. Hammond, S. Zhu, T. L. Khoo, S. M. Fischer, T. Pennington, D. Seweryniak, C. N. Davids

b. Outside Users of ATLAS During the Period October 1, 2002 - September 30, 2003

This list includes all outside Users who were an experiment spokesperson (a), alternate spokesperson (b), student (s), or collaborator actually present at ATLAS for an experiment. An additional 30 Users listed as collaborators on the various experiment proposals were not at ATLAS in person, and thus are not represented in the list below.

- | | |
|---|---|
| 1. Australian National University
P. Byrne
P. M. Davidson
b G. D. Dracoulis
T. Kibedi
G. J. Lane | 9. Harvard University
a J. M. Doyle
b D. N. McKinsey |
| 2. Brookhaven National Laboratory
A. Sonzogni | 10. Hebrew University of Jerusalem
s H. R. Nassar
ab M. Paul |
| 3. Columbia University
a Ph. Collon | 11. Institute of Nuclear Physics
R. J. Broda
a B. Fornal
T. S. Pawlat
J. Wrzesinski |
| 4. De Paul University
s J. Amann
a S. M. Fischer | 12. Johannes Gutenberg-Universität Mainz
I. Dillman |
| 5. Fermi National Laboratory
D. P. Moehs | 13. Kalamazoo College
s J. J. Letcher |
| 6. Florida State University
s A. L. Aguilar
M. A. Riley | 14. Keele University
M. A. Bentley
s C. Chandler |
| 7. Greenville College
A. J. Larabee | 15. Lawrence Berkeley National Lab.
M. Cromaz
M. Descovich
a P. Fallon
I.-Y. Lee
b A. O. Macchiavelli
s E. Rodriguez-Vieitez
D. Ward |
| 8. GSI, Darmstadt
M. Portillo | |

16. Los Alamos National Lab.
P. Garrett
R. Reifarh
17. Lund University
s R. G. du Rietz
s J. Ekman
H. Ryde
18. Massachusetts Inst. of Technology
b T. Antaya
as H. MacLean
19. McGill University
s C. Boudreau
s T. Cocolios
J. E. Crawford
S. L. Gulick
20. McMaster University
s R. A. E. Austin
A. A. Chen
21. Morehouse College
s S. R. Batchelor
22. Michigan State University
s S. N. Liddick
b K. Starosta
s B. E. Tomlin
23. Nat'l. Inst. of Standards & Tech.
P. R. Huffman
24. Northwestern University
bs L. Jisonna
a R. E. Segel
25. Oak Ridge National Laboratory
P. A. Hausladen
26. Princeton University
s D. J. Peng
27. Purdue University
P. J. Daly
Z. W. Grabowski
s O. Grubor-Urosevic
28. Purdue University, Calumet
R. A. Kaye
s B. Truett
29. Queen's University
s M. Liu
30. Rutgers University
s M. S. Johnson
31. S.U.N.Y. at Stony Brook
a D. B. Fossan
s T. Koike
s C. Vaman
32. Texas A & M University
J. C. Hardy
33. Trinity University
R. W. Laird
s B. McClain
34. TRIUMF
M. B. Smith
35. United States Naval Academy
a D. J. Hartley
36. Universität Wien
b W. Kutschera
37. Universität zu Köln
b P. Reiter
38. Università degli Studi di Milano
A. Bracco
F. Camera
O. Wieland
39. University of Bordeaux
a B. Blank
40. University of British Columbia
s D. Mackay
41. University of Chicago
s D. Lascar
s W. L. Trimble
42. University of Copenhagen
B. Herskind
G. Sletten
43. University of Edinburgh
T. Davinson
s P. Munro
s A. Robinson
ab P. J. Woods
44. University of Groningen
R. H. Siemssen

45. University of Guelph
s C. Andreoiu
a C. E. Svensson
46. University of Jyväskylä
C. L. Scholey
47. University of Liverpool
s S. Finnigan
R. Herzberg
s P. Ikin
E. S. Paul
G. Rainovski
48. University of Manchester
a S. J. Freeman
J. F. Smith
B. J. Varley
49. University of Manitoba
s L. Blomeley
bs J. Clark
s M. Froese
K. S. Sharma
J. C. Wang
50. University of Maryland
s N. Hoteling
as J. Shergur
W. B. Walters
51. University of Massachusetts, Lowell
a P. Chowdhury
s R. L. Gramer
G. Mukherjee
s E. Ngijoi-Yogo
S. K. Tandel
s C. Wilson
52. University of Naples
b M. Iavarone
53. University of Notre Dame
s P. S. Boutachkov
a U. Garg
s T. Li
s A. R. Teymurazyan
s X. Wang
s S. Zhu
54. University of Pennsylvania
D. P. Balamuth
55. University of Rochester
b D. Cline
s R. Teng
C-Y. Wu
56. University of Tennessee
C. R. Bingham
s M. T. Danchev
s M. Djongolov
s T. Goon
W. Krolas
b L. L. Riedinger
57. University of York
D. G. Jenkins
s F. Johnston-Theasby
P. Joshi
s P. M. Raddon
b R. Wadsworth
58. Washington University
W. Reviol
D. G. Sarantites
59. Western Michigan University
L. Paulius
L. Undreiu
ab A. H. Wuosmaa
60. Yale University
J. Caggiano
A. Heinz