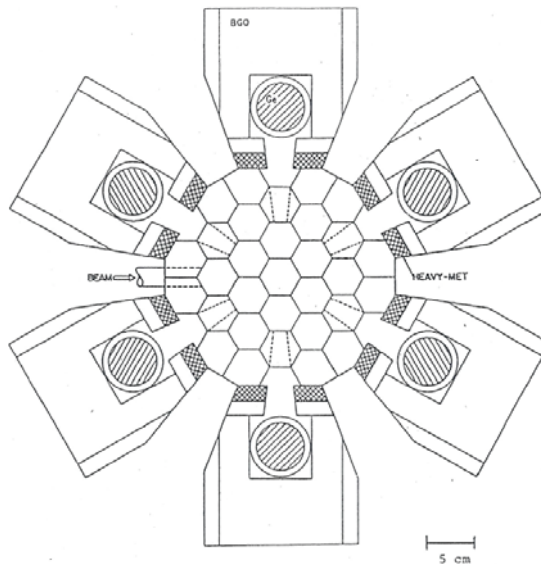




The Argonne-Notre Dame Gamma-Ray Facility

Recollections of a WONDERFUL

- ❖ Collaboration
- ❖ Instrument
- ❖ Time



Umesh Garg

University of Notre Dame

ATLAS 25th Anniversary
Celebrations



A proposal for PHASE I of a
BGO SUM-ENERGY/MULTIPLICITY SPECTROMETER
and a
MULTI-COMPTON-SUPPRESSION-SPECTROMETER SYSTEM.

U.Garg, E.G. Funk, J.J. Kolata, and J.W. Mihelich
Physics Department
University of Notre Dame
Notre Dame, IN 46556.

Submitted to
Division of Nuclear Physics
U.S. Department of Energy
Washington, D.C. 20545

October, 1983



Department of Energy
Chicago Operations Office
9800 South Cass Avenue
Argonne, Illinois 60439

MUR 8 8 1984

Dr. Francis M. Kobayashi
Office of Research and Sponsored
Programs
University of Notre Dame
Notre Dame, Indiana 46556

Dear Dr. Kobayashi:

SUBJECT PROPOSED NEW CONTRACT NO. DE-AC02-84ER40135, FOR A RESEARCH PROJECT
ENTITLED: "PHASE I OF A BGO SUM-ENERGY/MULTI-COMPTON-SUPPRESSION-
SPECTROMETER SYSTEM

Subject to the execution of a contract document, the Department of Energy can provide support for the subject new project in the amount of \$200,475 for the period January 1, 1984 through June 30, 1985.

Confirming my November 23, 1983 telephone conversation with Ms. Rogers, a revised budget will not be required. As we discussed, upon receipt of the other items requested on the enclosed requirements sheet, a contract will be negotiated.

This information should in no way be construed as a commitment on the part of the Department of Energy to reimburse costs incurred prior to the start date of the contract which will be negotiated after receipt of all required data.

Sincerely,

Myrna J. Randolph
Contract Specialist
Acquisition and Assistance Unit



Department of Energy

Chicago Operations Office
9800 South Cass Avenue
Argonne, Illinois 60439

APR 08 1986

Dr. Francis M. Kobayashi
Office of Research and Sponsored Programs
University of Notre Dame
Notre Dame, Indiana 46556

Dear Dr. Kobayashi:

SUBJECT: CONTRACT NO. DE-AC02-84ER40135 PROPOSED MODIFICATION A002

This is to advise you that, subject to the execution of a contract document, the Department of Energy can provide support for renewal of this contract in the amount of \$50,000.00 for the period July 1, 1985 through October 31, 1986 and subject to the availability of funds and satisfactory progress, an additional \$360,000.00 for the period November 1, 1986 through June 30, 1987.

Upon receipt of the items requested on the enclosed Requirements Sheet, a Special Research Contract will be negotiated.

This information should in no way be construed as a commitment on the part of the Department of Energy to reimburse costs incurred prior to the start date of the contract which will be negotiated after receipt of all required data.

Sincerely,

W. Kaye Smith
Contract Specialist
Acquisition and Assistance Unit



ARGONNE NATIONAL LABORATORY

9700 SOUTH CASS AVENUE, ARGONNE, ILLINOIS 60439

Telephone: 312-972-4004

August 26, 1985

Chancellor George A. Russell
Secretary to the Trustees, AUA Trust Fund
University of Missouri-Kansas City
5100 Rockhill Road
Kansas City, Missouri 64110

Dear Chancellor Russell:

On behalf of the Physics Division at Argonne National Laboratory, I wish to lend our strong support to the proposal recently submitted to the Argonne Universities Trust Fund by Notre Dame University for collaborative research in the development of a state-of-the art gamma-ray facility. This project will result in a forefront research instrument to study high-spin states in nuclei produced using the ATLAS heavy-ion accelerator at Argonne. The project has been under way now for about two years and is a collaborative effort involving personnel from Notre Dame and from Argonne.

I can honestly say that this collaboration is the smoothest and most fruitful of the many University collaborations of which I have been aware in my 23 years at Argonne. Unfortunately, because of a funding stringency in FY1986, the Notre Dame effort is likely to be quite severely hampered. For this reason, I would like to urge you to consider favorably the Notre Dame request submitted by Professor Umesh Garg, so that the project can proceed on a reasonable time-scale.

Perhaps I should emphasize that, although this collaboration is one between Notre Dame and Argonne, the final gamma-ray facility will be available to all ATLAS users. A large number of these are from several mid-western universities.

Yours sincerely,

A handwritten signature in cursive script that reads "Don Gemmell".

Donald S. Gemmell
Director, Physics Division

DSG:ms

bc: U. Garg ✓

**Total γ -Ray Spectrum in ^{153}Ho : From the Yrast Line into the Continuum**

D. C. Radford,^(a) I. Ahmad, R. Holzmann, R. V. F. Janssens, and T. L. Khoo
Argonne National Laboratory, Argonne, Illinois 60439

M. L. Drigert and U. Garg
University of Notre Dame, Notre Dame, Indiana 46556

and

H. Helppi
Lappeenranta University of Technology, Finland
(Received 17 May 1985)

2 CSS

LEVEL STRUCTURE OF ^{148}Gd UP TO $I=44$ ★

M. PIIPARINEN ^{a,1}, M.W. DRIGERT ^b, R.V.F. JANSSENS ^c, I. AHMAD ^c, J. BORGGREEN ^d,
R.R. CHASMAN ^c, P.J. DALY ^a, B.K. DICHTER ^c, H. EMLING ^{c,2}, U. GARG ^b,
Z.W. GRABOWSKI ^a, R. HOLZMANN ^c, T.L. KHOO ^c, W.C. MA ^c, M. QUADER ^a,
D.C. RADFORD ^c and W. TRZASKA ^a

^a *Purdue University, West Lafayette, IN 47907, USA*

^b *University of Notre Dame, South Bend, IN 46556, USA*

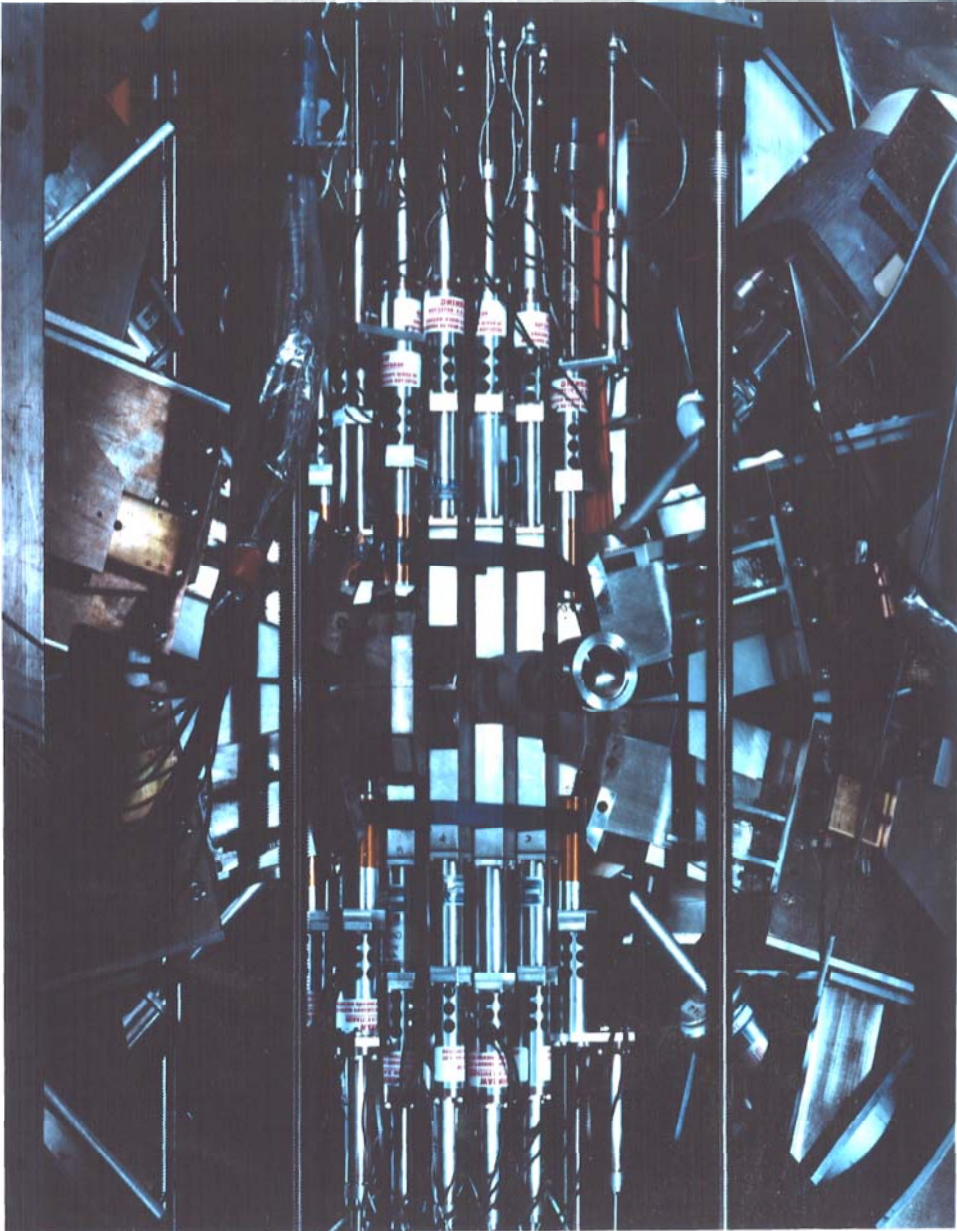
^c *Argonne National Laboratory, Argonne, IL 60439, USA*

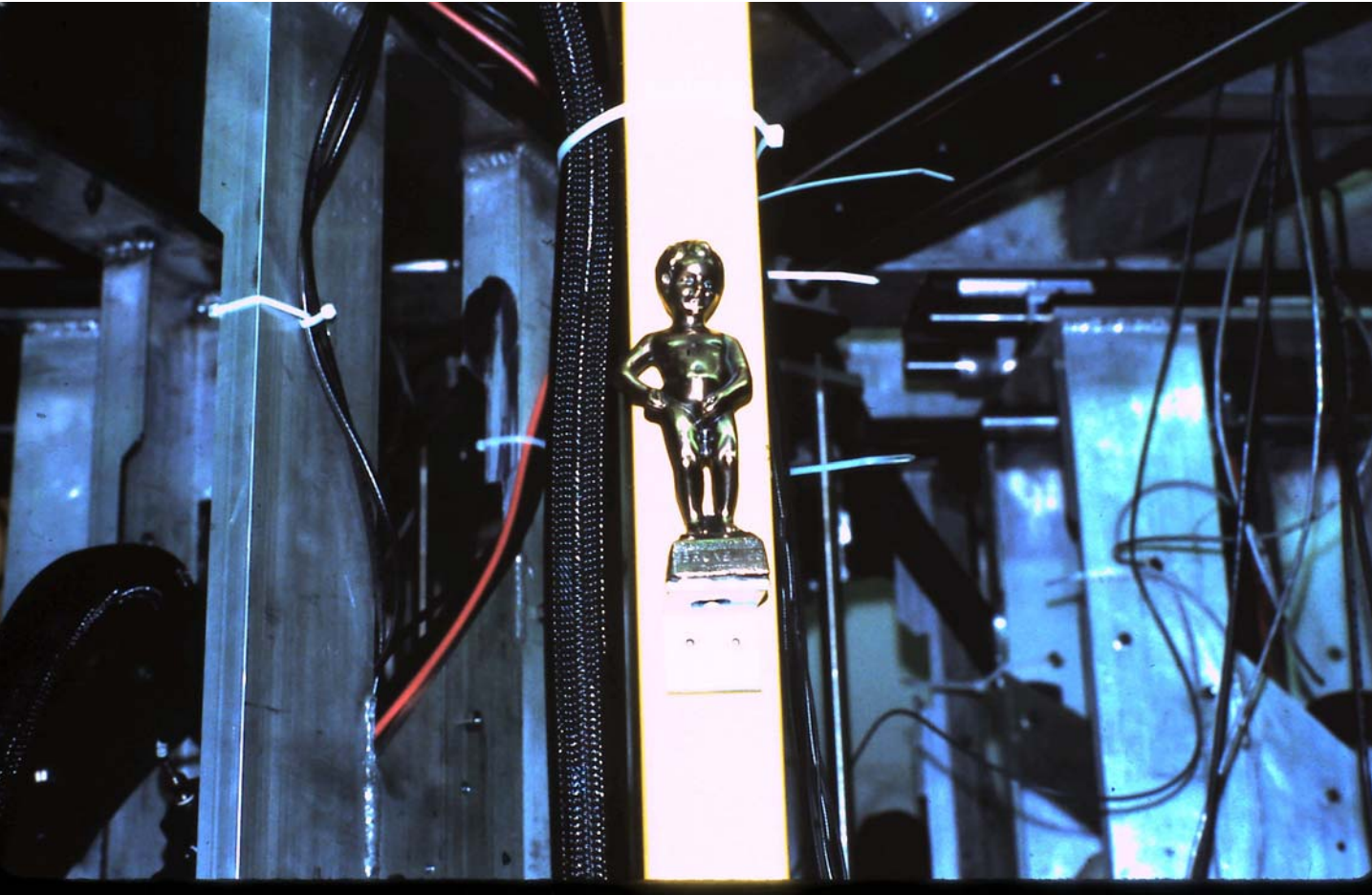
^d *Niels Bohr Institute, Risø, DK 4000 Roskilde, Denmark*

^e *Chalk River Nuclear Laboratories, Chalk River, Ontario, Canada K0J 1J0*

Received 16 March 1987

2 CSS + 14 BGO's





**A SUPERDEFORMED BAND IN ^{151}Dy ***

G.-E. RATHKE ^a, R.V.F. JANSSENS ^a, M.W. DRIGERT ^b, I. AHMAD ^a, K. BEARD ^c,
R.R. CHASMAN ^a, U. GARG ^c, M. HASS ^{a,1}, T.L. KHOO ^a, H.-J. KÖRNER ^{a,2}, W.C. MA ^{a,3},
S. PILOTTE ^d, P. TARAS ^d and F.L.H. WOLFS ^a

^a Argonne National Laboratory, Argonne, IL 60439, USA

^b Idaho National Engineering Laboratory, EG & G Idaho Inc., Idaho Falls, ID 83415, USA

^c University of Notre Dame, Notre Dame, IN 46556, USA

^d Université de Montréal, Montreal, Quebec, Canada H3C 3J7

Received 6 April 1988

This experiment is the first one performed with the full Argonne–Notre Dame gamma-ray facility. The authors express their gratitude to V. Kubiľius for his design work, to J. Ray, J. Timm, J. Joswick, and A. Horvath for their technical assistance, to P. Wilt for help with the electronics, and to T. Moog for the data acquisition software. One of the authors (G.-E.R.) would like to thank the Alexander-von-Humboldt-Stiftung for granting a Feodor-Lynen-Stipendium.

**Observation of Superdeformation in ^{191}Hg**

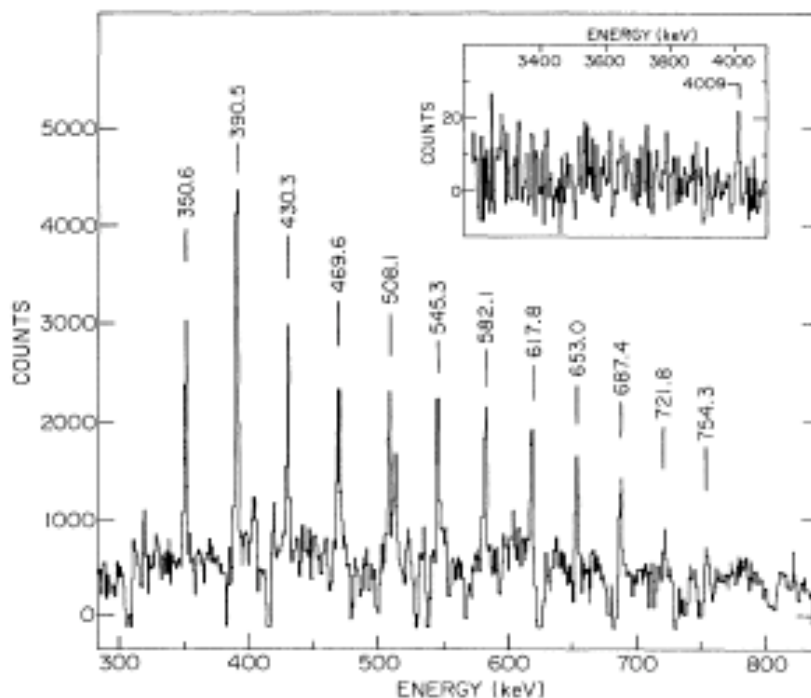
E. F. Moore, R. V. F. Janssens, R. R. Chasman, I. Ahmad, T. L. Khoo, and F. L. H. Wolfs
Argonne National Laboratory, Argonne, Illinois 60439

D. Ye, K. B. Beard, and U. Garg
University of Notre Dame, Notre Dame, Indiana 46556

M. W. Drigert
Idaho National Engineering Laboratory, EG&G Idaho Inc., Idaho Falls, Idaho 83415

Ph. Benet and Z. W. Grabowski
Purdue University, West Lafayette, Indiana 47907

J. A. Cizewski
Rutgers University, New Brunswick, New Jersey 08903
(Received 8 March 1989)



String Theorists Unstuck Thanks to Three-Way Solution of Two-Dimensional Quantum Gravity

This period's list of the hottest papers in physics offers a smorgasbord of subjects ranging from the sublime of string theory to what some are openly calling the ridiculous of cold fusion. Adding further spice to the repast are highly cited reports on superconductivity, nuclear physics, high-energy physics, and on a connection between quantum field theory and the Jones polynomial by that epicurean of equations Edward Witten of the Institute for Advanced Study in Princeton. In other words, the accompanying table is set with something to nearly everyone's taste.

A trio of papers now ranking third, fourth, and fifth represent three independent yet essentially similar two-dimensional treatments of quantum gravity—a breakthrough that string theorists had been hungering for. Spotting a rapid accumulation of citations to these three

papers and others, *Science Watch* tipped two-dimensional quantum gravity as one of the hottest areas in the physical sciences in 1990 (see *Science Watch*, 1[11]:1-2, December 1990).

"There's great interest in this subject," says David J. Gross of Princeton University. "This was the first time that anybody managed to exact solutions of any kind to string theory or to any model of quantum gravity, and then many others started looking into this. The reason it excited so much attention was two-fold. First, on general grounds, the subject was very interesting to string theorists who had been somewhat stuck in their work. Second, these studies opened up a host of new problems. Once researchers had something well-defined to calculate, they began publishing hundreds of papers exploring different aspects and generalizations of these

models. And we've learned some new things. For example, one generalization seems to describe black holes—albeit in model form—in a way that's rich enough to capture their physics in a kind of solvable context. That's perhaps the latest burst of interest from all this, and things haven't died down. Work is still going on; there's a lot of structure yet to be uncovered."

Superdeformation

Jumping into the chart at eighth position is a report on experimental studies of nuclear structure and the forces that drive nuclei toward so-called superdeformation.

"Basically, we were trying to get at the dynamics of nuclei at very high spinning velocities," says Robert V.F. Janssens of the Argonne National Laboratory in Illinois. "All nuclei are not necessarily spherical. Some may have shapes like, let's say, a flattened doorknob, and some are like an American football, although the deformations that one usually encounters are not very large. This deformation occurs when you push nuclei to rotate—when you pump enough energy and angular momentum into them to make them spin very fast. The first such case of a superdeformed nucleus—that is, demonstrating an axis ratio of 2:1—was in the mass region of $A = 150$, and that was in 1986. Since then, researchers have asked whether there are any other regions in the periodic table where such phenomena would occur. In our paper, we found the first case of superdeformed nuclei around a mass of 190."

Janssens points out that the same physical effects that allow nuclei to take a 2:1 axis ratio are basically the same forces that drive nuclei toward fission. "Superdeformation is by far the hottest topic in nuclear structure physics today," Janssens tells *Science Watch*.

A review of the electronic structure of superconducting materials returns to the Top Ten in the #2 slot, having last appeared early in the year (see *Science Watch*, 2[1]:6, January/February). A second hot high- T_c paper discusses vortex lattice phenomena in oxide superconductors (#10).

As mentioned, the cold-fusion papers, by Fleischmann-Pons and by Jones *et al.* (#1 and #6), have once again risen, phoenix-like, after the former slipped to the bottom and the latter fell off the physics hot list last period. This resurgence seems to reflect the activities of a small but determined band of table-top fusion proponents who refuse to just say no (see *Science Watch*, 2[1]:6, January/February 1991). When *Science Watch* examined the origin of the citations to these two papers during the first quarter of 1991, it found that fully a third came from *Fusion Technology*, a journal favored by cold fusionists.

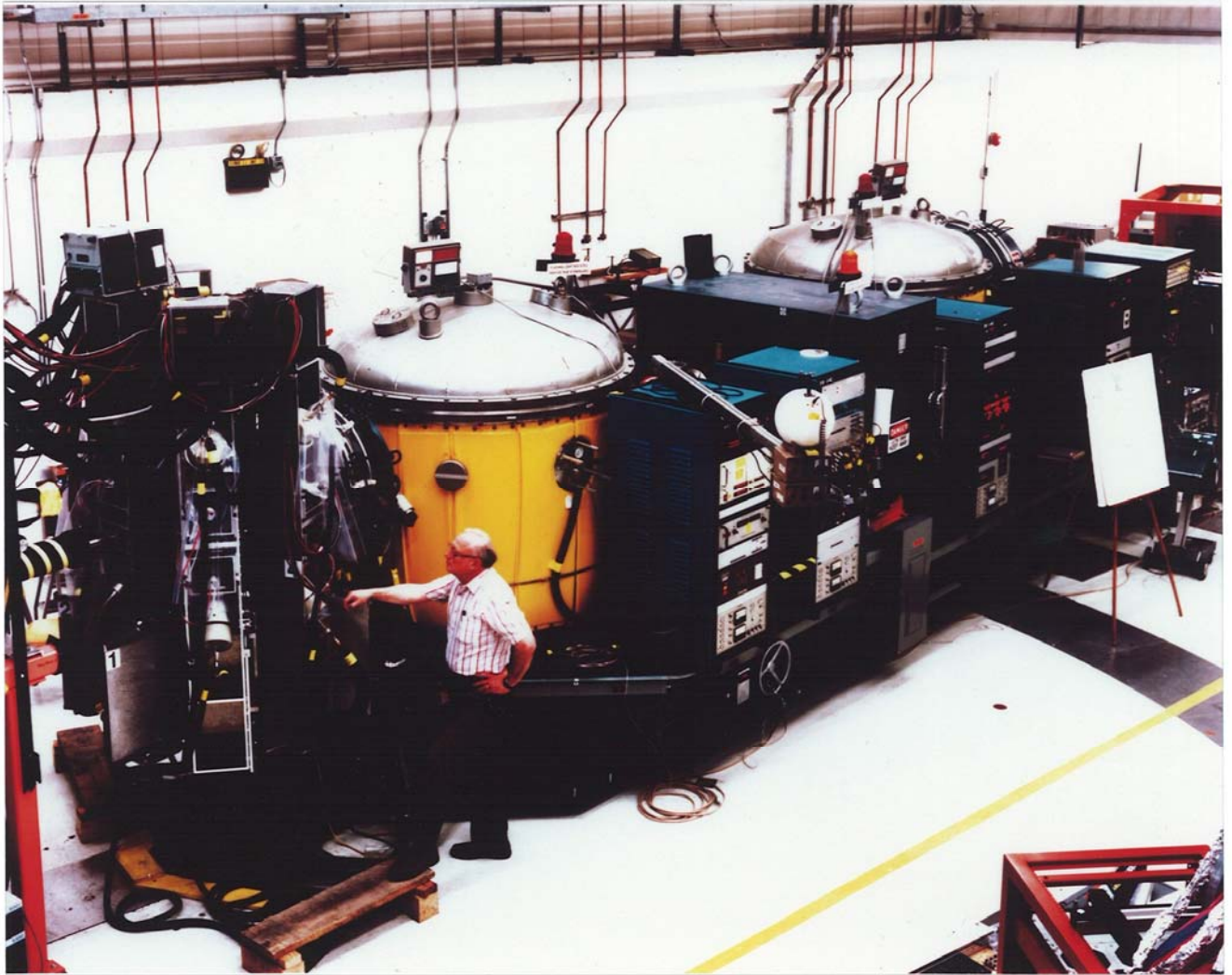
WHAT'S HOT IN PHYSICS...

| Rank | Paper | Citations This Period (Jan-Feb 91) | Rank Last Period (Nov-Dec 90) |
|------|--|------------------------------------|-------------------------------|
| 1 | M. Fleischmann, S. Pons, "Electrochemically induced nuclear fusion of deuterium," <i>J. Electroanal. Chem. and Interfacial Electrochem.</i> , 261(2A): 301-8, 10 April 1989. [U. Southampton, U.K.; U. Utah, Salt Lake City] | 23 | 9 |
| 2 | W.E. Pickett, "Electronic structure of the high-temperature oxide superconductors," <i>Rev. Mod. Phys.</i> , 61(2):433-512, April 1989. [Naval Res. Lab., Washington, D.C.] | 22 | * |
| 3 | E. Brézin, V.A. Kazakov, "Exactly solvable field theories of closed strings," <i>Phys. Lett. B</i> , 236(2):144-50, 15 February 1990. [Ecole Norm. Super., Paris] | 21 | 8 |
| 4 | D.J. Gross, A.A. Migdal, "Nonperturbative two-dimensional quantum gravity," <i>Phys. Rev. Lett.</i> , 64(2):127-30, 8 January 1990. [Princeton U., N.J.] | 20 | * |
| 5 | M.R. Douglas, S.H. Shenker, "Strings in less than one dimension," <i>Nucl. Phys. B</i> , 335(3):635-54, 14 May 1990. [Rutgers State U., Piscataway, N.J.] | 19 | * |
| 6 | S.E. Jones, E.P. Palmer, J.B. Czirr, D.L. Decker, G.L. Jensen, J.M. Thorne, S.F. Taylor, J. Rafelski, "Observation of cold nuclear fusion in condensed matter," <i>Nature</i> , 338(6218):737-40, 27 April 1989. [Brigham Young U., Provo, Utah; U. Arizona, Tucson] | 18 | * |
| 7 | E. Witten, "Quantum field theory and the Jones polynomial," <i>Commun. Math. Phys.</i> , 121(3):351-99, March 1989. [Inst. Adv. Study, Princeton, N.J.] | 17 | 5 |
| 8 | E.F. Moore, R.V.F. Janssens, R.R. Chasman, I. Ahmad, T.L. Khoo, F.L.H. Wolfs, D. Ye, K.B. Beard, U. Garg, M.W. Drieger, P. Benet, Z.W. Grabowski, J.A. Cizewski, "Observation of superdeformation in ^{191}Hg ," <i>Phys. Rev. Lett.</i> , 63(4):360-3, 24 July 1989. [Argonne Natl. Lab., Ill.; U. Notre Dame, Ind.; EG&G Idaho Inc., Idaho Falls; Purdue U., W. Lafayette, Ind.; Rutgers State U., New Brunswick, N.J.] | 16 | * |
| 9 | The L3 Collaboration, "A determination of the properties of the neutral intermediate vector boson Z^0 ," <i>Phys. Lett. B</i> , 231(4):509-18, 16 November 1989. [36 institutions worldwide] | 14 | * |
| 10 | E.H. Brandt, "Thermal fluctuation and melting of the vortex lattice in oxide superconductors," <i>Phys. Rev. Lett.</i> , 63(10):1106-9, 4 September 1989. [Max Planck Inst., Stuttgart, F.R.G.] | 14 | * |

SOURCE: ISI's Hot Papers Database

NR: Only papers published since January 1989 are tracked. An asterisk indicates that the paper was not ranked in the Top Ten during the last period. In the event that two or more papers collected the same number of citations in the most recent bimonthly period, total citations to date determine the rankings.







NOTRE DAME

"Ball"

Electronics

- CAMAC controlled CFD's
- Analog & Logic Delays
- Multiplicity Register
- ⋮

Machining of parts of the support system (\$\$\$!)

ARGONNE

"CSS"

Design & assembly of overall electronics system

Design and construction of mechanical support system

Project Management : RVFJ

Software development for control of electronics modules and data acquisition

In-situ tests on final assembly

People :

U. G.

M. W. Drigert

K. B. Beard

J. J. Kolata

P. W. Wilt

R. V. F. Janssens

T. L. Khoo

R. Holzmann

I. Ahmad

D. C. Radford

\$\$\$

D. O. E.

Argonne (DEP)

AUA Trust fund

Univ. of Notre Dame

D. O. E.

Univ. of Chicago

Director's discretionary funds



शुभास्ते पंथानः सन्तु



धन्यवाद

Thanks!

