

# Topical Group on Few-Body Systems and Multiparticle Dynamics

Newsletter, March 2003

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## MESSAGE FROM THE CHAIR

Greetings to all GFB members. It is election time. Included in this newsletter are the candidates for Vice Chair, Secretary Treasurer, and two new members of Executive Committee. Each candidate has provided a short biography and a statement outline their goals if elected to office. As usual the candidates come from many of the disciplines that comprise our Group, reflecting the fact that our members come from atomic, molecular, nuclear, mathematical, chemical, particle .... physics. According to unit cross reference taken in January 2003, GFB has members from every APS Division, with DNP, DAMOP, DCOMP, DPF, and DCP making up the main sources in decreasing order of participation. Our new leaders may want to consider this diversity and assume the charge of finding ways that a small topical group can make a significant impact in

unifying different disciplines with common interests.

Please consider this excellent choice of candidates carefully and vote either online or by mailed ballot. Voting on line is easy and fast. Try it.

Traditionally the GFB holds its annual gathering at the Spring meeting of the American Physical Society. Based on the size of its membership, the GFB gets currently one invited session at this meeting. Typically, the GFB uses this single invited session allotment to co-organize two joint sessions, one with DAMOP and one with the DNP. These two divisions are the two largest sources of GFB membership. DAMOP presently concentrates on its separate divisional meeting and does not participate widely in the APS spring meeting. The result has been that some very fine invited sessions organized by GFB/DAMOP for the spring meeting are poorly attended.

Since the GFB has common interest and strong intellectual ties with DAMOP, along with DNP and with the DCOMP, the DAMOP presence is seriously missed. The Division of Particles and Fields will hold their divisional meeting at the APS Spring Meeting.

This is a welcome addition in the spirit of unity and common interests of a general APS meeting.

This year the APS Spring Meeting will take place in Philadelphia, PA, 5-8 April 2003. The GFB Invited Session will be a stand-alone session, i.e., not joint with other Divisions. We hope sincerely that this will not set a precedent since the GFB Topical Group wants to represent diversity and produce cross fertilization among disciplines. We hope to plan a joint session at the DAMOP divisional meetings in the near future.

For more information, please see a piece in the recent DAMOP newsletter

(<http://www.aps.org/DAMOP/newsletters/1102news.html#special>) by the GFB Chair-Elect, Tom Rescigno.

We thank Betsy Beise, who organized the GFB session, together with the aid of the GFB Program Committee.

The session is tied together with a single theme, featuring two experimental talks and two theoretical talks. A list of the speakers with titles and time slots is given below.

Session K6. GFB: Electromagnetic Physics in Helium Nuclei.

Session Chair, Betsy Beise (University of Maryland)

Sunday afternoon, 14:00, Commonwealth D, Loews Philadelphia Hotel

14:00 K6.001 The Spin Structure of the Neutron Extracted from Polarized  $^3\text{He}$

Wolfgang Korsch (University of Kentucky, Lexington, KY 40506)

14:36 K6.002 Proton Knockout from  $^4\text{He}$

Bodo Reitz (Jefferson Lab)

15:12 K6.003 NN Correlations Measured in  $^3\text{He}(e, e'pp)n$

Lawrence Weinstein (Old Dominion University)

15:48 K6.004 Relativistic Effects in Three-Nucleon Systems

Alfred Stadler (University of Évora, and Centro de Física Nuclear,

University of Lisbon, Portugal)

In addition to this very interesting session, there are contributed papers in the GFB category. Please see the APS web site for the entire program.

Further, we encourage you to come to the GFB Business Meeting: Session S10. GFB Business Meeting. Monday afternoon, 17:30, Washington B, Loews Philadelphia Hotel. The GFB Business meeting follows Session R2, the DNP Prize Session, which takes place on Monday afternoon, 14:30, Regency Ballroom B, Loews Philadelphia Hotel. Congratulations to this year's GFB Fellow: Jeffrey L. Krause, University of Florida, Citation:

For his fundamental research on the dynamics and control of atomic and molecular states in external fields, including the theoretical interpretation of experimental results and the prediction of novel phenomena.

Congratulations also to a second fellow, nominated to the GFB, but elected through the International Forum: Shin Nan Yang, National Taiwan University, Citation: For his pioneering work on three-nucleon forces, dynamical approach to pion photoproduction, and investigations of strangeness in the nucleon using phi photo-production.

The deadline for nominations for APS Fellowship through our Topical Group is 1 April 2003. The few body

community is quite active outside the United States. Many of these physicists are members of GFB. However, many of these distinguished members are not APS Fellows. If we nominate two of these members for APS Fellowship, we may be able to promote two GFB members to fellowship using the leverage of co-sponsorship with the International Forum.

In addition, please nominate worthy candidates from under-represented groups. You can check out the list of current GFB members in the back of the APS membership directory or online to see which of your worthy colleagues you might want to nominate.

The size of GFB membership is crucial for maintaining its viability. Not only does it determine the number of sessions we can organize, but the number of APS Fellows we can nominate. The GFB membership is currently 325, which limits us to one APS Fellow nomination and one APS invited session. We are still dangerously close to the limit of 300 members, below which the APS may revoke our topical group status.

Since we are a small Topical Group, we can increase our numbers significantly by each of us personally getting a new member as well as reminding former members to re-join. It is easy to join our Topical Group online and pay with a credit card at <http://www.aps.org/memb/unitapp.html>. However, since the APS Membership Department now bills its members according to an anniversary date, it is confusing to many, who want to join the GFB mid-cycle in their APS billing period. We suggest that you contact the APS Membership Department at 301-209-3280 or [membership@aps.org](mailto:membership@aps.org) to request GFB membership and a prorated dues payment.

Don't forget, students can join APS with the first year free and get all the benefits of APS membership. Encourage your students to join the APS and the GFB. The larger our membership, the more fellows we can sponsor, the more sessions we can organize, and the more impact we can have for unity of physics at the APS.

The GFB Topical Group wants to thank Jim McGuire, who is currently Past-Chair of the GFB. Jim has been very active in getting all of us motivated to make the GFB more viable. We wish him well in his new responsibilities in the Chair line of DAMOP.

We look forward to working with him in that capacity as a good friend to GFB. We also want to give special thanks to the Secretary-Treasurer, Carl Carlson for his excellent work in the ongoing job of keeping the GFB functioning.

Every year the GFB has new officers, but Carl keeps things going smoothly serving as the corporate memory.

We also want to thank the Executive Committee members, C. William McCurdy and Wayne Nicholas Polyzou, who are retiring after the APS Spring Meeting. We would also like to thank the various committees for their work.

These include the Nominating Committee, the Fellowship Committee, and the Program Committee. These committees are listed elsewhere in this newsletter.

Finally we want to thank the GFB webmaster, Charlotte Elster for doing an admirable job with the GFB website. Please check out our website, we have recently updated it. You can get there by going to the APS Topical Group site for GFB or directly at <http://www.phy.ohiou.edu/~gfb/> If you have ideas for the Picture Gallery on the GFB website, please propose them. Let's get some nice pictures from the DAMOP members.

I wish you all piece of mind and a happy and healthy year ahead.

Virginia R. Brown, Chair GFB 2002-2003

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## ELECTIONS --- ELECTRONIC VOTING

Enclosed is your ballot for our 2003 election of officers. We will elect a Vice-Chair and two members of our Executive Committee. The Vice-Chair serves a term of one year, becomes Chair-Elect the next year, and assumes the Chair the following year. The Secretary-Treasurer and the Members-at-large of the Executive Committee serve three-year terms. The newly elected officers will assume their positions beginning May 2003.

Don Madison and Colm Whelan are the candidates for Vice Chair. Candidates for Secretary-Treasurer are Lee Collins and Charlotte Elster.

Candidates for the Executive Committee are Ben Gibson, David Ernst, Mike Lieber, and Ravi Rau. Brief

biographies and statements of the candidates are given below.

The present officers are Jim McGuire, Past-Chair; Virginia Brown, Chair; Tom Rescigno, Chair-Elect; Rocco Schiavilla, Vice-Chair; Carl Carlson, Secretary-Treasurer. The current Executive Committee members (and the years their terms expire) are: Dan Phillips (05), Joe Macek (05), Lee Collins (04), Harold Fearing (04), C. William (Bill) McCurdy (03), and Wayne Polyzou (03).

You may vote electronically by going to Web Site

<http://www.physics.wm.edu/~carlson/ballot03.html>

or you may vote by paper ballot submitted by regular mail (but not both!). Either way please ensure your ballot is received before the 03 April DEADLINE.

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## CALL FOR APS FELLOWSHIP NOMINATIONS

A major benefit to the members of the topical group is that the group can nominate members to become Fellows of the Society. The number of nominations the group can put forward depends predominantly on our total membership. The choice of our candidate(s) from among those next nominated will be made by our current Fellowship Committee: Tom Rescigno, Virginia Brown, and Joe Macek . I urge you to think about colleagues worthy of Fellowship who have never been elected and get together the necessary material for nomination to APS. We had two excellent new Fellows (see below) elected through our group last year. We still have many qualified group members who are not yet Fellows, so lets nominate them.

Information regarding the nomination procedure and the necessary forms can be easily obtained through the APS home page ([www.aps.org/fellowship/](http://www.aps.org/fellowship/)) or our own group home page (under Fellows). The DEADLINE for nominations for our Topical Group is 1 April each year. Please make sure the full package has been submitted to the APS before this date.

## CONGRATULATIONS TO OUR NEW FELLOWS

Jeffrey L. Krause and Shin Nan Yang were elected to Fellowship in the APS under the wings of the GFB last year. Congratulations to both of them. Krause's fellowship citation read, *For his fundamental research on the dynamics and control of atomic and molecular states in external fields, including the theoretical interpretation of experimental results and the prediction of novel phenomena.* Yang's fellowship citation read,

*For his pioneering work on three-nucleon forces, dynamical approach to pion photoproduction, and investigations of strangeness in the nucleon using phi photo-production.*

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## APRIL MEETING

The APS April Meeting will be held from April 5-8, 2003 in Philadelphia, Pennsylvania.

At the Spring meeting we are sponsoring one session, and some details are given here, including the abstracts of the talks.

Session K6. *GFB: Electromagnetic Physics in Helium Nuclei.*

Session Chair, Betsy Beise (University of Maryland)

Sunday afternoon, 14:00, Commonwealth D, Loews Philadelphia Hotel

14:00 K6.001 *The Spin Structure of the Neutron Extracted from Polarized He-3*

Wolfgang Korsch (University of Kentucky, Lexington, KY 40506)

14:36 K6.002 *Proton Knockout from He-4*

Bodo Reitz (Jefferson Lab)

15:12 K6.003 *NN Correlations Measured in  $^3\text{He}(e, e'pp)n$*

Lawrence Weinstein (Old Dominion University)

15:48 K6.004 *Relativistic Effects in Three-Nucleon Systems*

Alfred Stadler (University of Évora, and Centro de Física Nuclear,  
University of Lisbon, Portugal)

### **Listing with abstracts:**

[K6.001] *The Spin Structure of the Neutron Extracted from Polarized He-3*

Wolfgang Korsch (University of Kentucky, Lexington, KY 40506)

In recent years a major focus in spin-dependent, deep-inelastic scattering has been the precision study of the moments of the spin structure functions,  $g_1$  and  $g_2$ , for both the proton and the neutron. However, the detailed dependence of the functions  $g_1(x, Q^2)$  and  $g_2(x, Q^2)$  on the kinematical variables Bjorken  $x$  and momentum transfer  $Q^2$  is poorly known in certain regions, i.e., for large and very small values of  $x$  for all  $Q^2$  and for  $Q^2$  values less than about  $1.0 \text{ GeV}^2$  for all  $x$ . The detailed shapes of the structure functions in these regions are of special interest, as they permit insight into lingering questions concerning the nucleon's spin structure.

Probing the  $x \ll 1$

region, e.g., potentially allows us to investigate the transition from a perturbative QCD regime to a non-perturbative, valence quark regime. In contrast, probing the low  $Q^2$  behavior of the spin structure function  $g_2(x, Q^2)$ , which is related to the nucleon's spin distribution transverse to the virtual photon direction, serves as a unique testing ground for the transition from incoherent to coherent, inclusive, lepton-parton scattering.

The significance of quark-gluon correlations are expected to become more pronounced at lower values of  $Q^2$  ( $< 1.0 \text{ GeV}^2$ ).

We have measured inclusive, longitudinal and transverse, deep-inelastic scattering asymmetries in the beam and target polarized  $^3\text{He}(e, e')$  reaction using the highly polarized electron beam and the Hall A polarized  $^3\text{He}$  target at Jefferson Lab. Neutron asymmetries for  $x$  values between 0.33 and 0.61 were extracted which allowed us to determine the flavor decomposed ratios  $\int_0^1 g_1^u/u$  and  $\int_0^1 g_1^d/d$ . Moreover, a precision measurement of  $g_2^n(Q^2)$  for  $Q^2$  values down to  $0.6 \text{ GeV}^2$  at  $x$  approximately 0.2 was performed. The impact of these measurements on our present understanding of the neutron spin structure will be discussed.

[K6.002] *Proton Knockout from He-4*

Bodo Reitz (Jefferson Lab)

The  $(e, e'p)$  reaction on few-body nuclear targets is a powerful tool to investigate specific aspects of the

nucleus.  $^4\text{He}$  is an especially interesting target since it has all the ingredients of a complex, heavy nucleus, while as an  $A$

$= 4$  system, microscopic calculations are still feasible. Making use of the high luminosity electron beam at Jefferson Lab and the high resolution spectrometers in Hall A, high precision cross section measurements of  $(e,e'p)$  reactions in kinematic regions previously inaccessible, are now possible. I will focus my talk on a recent Jefferson Lab Hall A experiment which has measured the  $^4\text{He}(e,e'p)^3\text{H}$  cross section at recoil momenta up to 500 MeV/c in various kinematics. Many calculations predict a sharp minimum in the spectral function for those recoil momenta and show that its location is sensitive to the short range part of the nucleon-nucleon potential. Measuring this cross section at various kinematical settings for the same recoil momentum additionally allows us to study reaction dynamics such as final-state interactions and meson-exchange currents. I will present preliminary results of this experiment.

[K6.003] *NN Correlations Measured in  $^3\text{He}(e,e'pp)n$*

Lawrence Weinstein (Old Dominion University)

We now have reasonably good descriptions of average single nucleon properties in nuclei. The next step in understanding nuclear structure is to measure average nucleon pair properties in nuclei (i.e.: two nucleon correlations). We have recently performed the first large acceptance kinematically complete measurements of 1 to 4 GeV electron scattering from  $^3\text{He}$  with a 4  $\diamond$  magnetic spectrometer (the Jefferson Lab CLAS). This talk will present  $^3\text{He}$  correlated momentum distributions measured using two techniques: 1) the virtual photon is absorbed by one nucleon and its correlated (high momentum) partner also leaves the nucleus and 2) the virtual photon is absorbed by the third nucleon in  $^3\text{He}$  and the residual spectator correlated pair then flies apart. The measured  $pp$  and  $pn$  pair relative momentum distributions extend up to 600 MeV/c.

[K6.004] *Relativistic Effects in Three-Nucleon Systems*

Alfred Stadler (University of  $\diamond$ vora, and Centro de F $\diamond$ sica Nuclear, University of Lisbon, Portugal)

The Spectator or Gross formalism is a manifestly covariant framework based on field theory for the description of few-body systems. It consists of equations that effectively sum an infinite number of Feynman diagrams, with the characteristic feature that, in any included Feynman diagram, spectator particles are consistently placed on mass shell.

In recent years, the Spectator theory has been applied successfully to a variety of problems. In particular, realistic potentials of one-boson exchange type have been constructed yielding a very good description of the two-nucleon bound state and scattering data. Calculations of the deuteron electromagnetic form factors also achieved a very good agreement with the available data. The three-nucleon bound state was calculated using the two-nucleon Spectator amplitudes as dynamical input, and a binding energy close to the experimental value was obtained. We are now applying the Spectator theory to elastic and inelastic electron scattering from the three-nucleon bound state. I will review the relativistic effects found in the three-nucleon bound state and report on the status of the ongoing electron-scattering calculations.

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## INTERNATIONAL CONFERENCE ON FEW-BODY PROBLEMS IN PHYSICS

The 17th International Conference on Few-Body Problems in Physics will be held this year in Durham, North Carolina, USA, June 5 - 10, 2003.

It will be hosted by the Triangle Universities Nuclear Laboratory (TUNL) at Duke University in Durham. This is the international IUPAP-sponsored conference that meets now every three years, most recently at Adelaide (1992), Williamsburg (1994), Groningen (1997) and Taipei (2000). Werner Tornow and Walter Gloeckle are co-chairs, and more information can be gotten at <http://www.tunl.duke.edu/fb17/> .

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## GORDON CONFERENCE ON NUCLEAR PHYSICS

There is not currently a Gordon Conference on Few Body Problems.

However, there is a Gordon Conference on Nuclear Physics that will be of interest to some of our membership.

The nuclear physics Gordon Conference will take place July 20-25 at Colby College in Waterville, Maine. Barry Holstein is the chair and has put together a broad program with an outstanding group of speakers---take a look at <http://www.grc.org/programs/2003/nucphys.htm> ---which covers many of the ``hot" areas in the field.

As always with Gordon Conferences, the talks take place in the morning and evening, leaving the afternoons free for interactions.

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## CANDIDATES BIOGRAPHIES AND STATEMENTS

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## CANDIDATES FOR VICE-CHAIR

### **Don H. Madison**

University of Missouri-Rolla

#### BIOGRAPHY

B.A. (Mathematics), Sioux Falls College, 1967; Ph.D. (Physics), Florida State University, 1972; Postdoctoral Research Associate, University of North Carolina (Eugen Merzbacher), 1972-74; Assistant, Associate and Professor of physics, Drake University, 1974-1984; Ellis and Nelle Levitt Professor of Physics, Drake University, 1984-88; Professor of Physics, University of Missouri-Rolla; 1988-98; Curators ♦ Professor of Physics, University of Missouri-Rolla, 1998-present; Visiting Scientist, University of M♦nster, 1984; Visiting Scientist, Flinders U. of South Australia, 1988; Visiting Scientist, Institute of Theoretical Physics, Santa Barbara, 1991; Director of the Laboratory for Atomic, Molecular and Optical Research, University of Missouri-Rolla, 1999-present; Fellow of the American Physical Society, 1993; President of TAMOC, 1994-1998; DAMOP Program Committee, 1994-1997; US Organizer for joint US-Australia Workshop, 1995; Organizer of DAMOP Undergraduate Research Competition, 1994-2000; APS Committee on Education, 1997-1999; DAMOP Committee on Publications, 1996-1999; DAMOP Education Committee, 1999-2002; ICPEAC general committee, 1999-2003; International Chair for "The International Symposium on (e,2e), Double Photoionization and Related Topics"; 1999-2001; International Chair for "Eleventh International Symposium on Polarization and Correlation in Electronic and Atomic Collisions ♦, 1999-2001; treasurer of the GEC (2003-2006), Organizing committee for 15 different International meetings.

Research Interests: Perturbative and non-perturbative approaches to atomic scattering theory; Time-dependent scattering theory; Interaction of electrons, positrons and ions with atoms and molecules.

#### CANDIDATE'S STATEMENT

I learned scattering theory from nuclear books and papers in the late 60's and early 70's and have been working in AMO physics since.

In spite of my best intentions, I have not managed to keep up with developments in other areas very well. On the other hand, it is inconceivable that my own work could not have benefited from advancements in related fields.

For me, the primary appeal of the APS Topical Group on Few-Body Systems and Multiparticle Dynamics is to bring together people with similar interests from different specialties to provide both a forum for presenting the latest developments as well as for cultivating cross disciplinary collaborations. I think this is the strength of the forum and, if I were elected, I would encourage activities designed to promote and enhance this strength.

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## Colm Whelan

### Old Dominion University

#### BIOGRAPHY

Colm T. Whelan has been Professor of Physics and Chair of the Physics Department of the Old Dominion University since August 2001. Before that time he lead the Atomic Physics group, in the University of Cambridge where he was a Fellow of Magdalene College. He received his PhD from Cambridge in 1985. His publication list contains 5 books and more than 140 research papers. He has held visiting positions in Brest, Frankfurt am Main, Harvard (ITAMP), Metz, Sendai and Waterloo. He is a Fellow of the Institute of Physics and American Physical Society. He has served on the Few Body Topical Group (GFB) Nominating Committee. In 2002 he held a Mercator Visiting Professor at the University of Frankfurt am Main in Germany and was awarded a higher doctorate (Sc.D.) by the University of Cambridge. He has been principal investigator on 10 different international collaborative grants. His main aim area of interest is few body atomic collision theory.

#### CANDIDATE'S STATEMENT

There is a unity to Physics and there is a real need in this age of specialization to build bridges between different sub-disciplines and to focus attention on areas of similarity and overlap. It is clear that atomic and nuclear physicists face many similar problems, and that theoretical, experimental and computational techniques developed in one sub-field may often be an invaluable tool in another. The Few Body Topical group is a forum, which is ideally suited for bringing together those physicists whose research is concerned with the interactions of a small number of particles. As Chair of the GFB, I would work towards strengthening the GFB base by increasing the membership. I would like to organize international workshops on Few Body Physics and use this both to enhance communication between the sub-fields but also to encourage greater contacts with groups outside the US.

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## CANDIDATES FOR SECRETARY-TREASURER



# Lee Collins

## Los Alamos National Laboratory

### BIOGRAPHY

Lee Collins is a Laboratory Fellow at the Los Alamos National Laboratory, where he has been a staff scientist since 1977. He received a Ph.D. degree in Physics from Rice University in 1975. Editorial positions and honors include:

Specialist Editor for Computer Physics Communications (1983-1991); Editorial Board Member (1991-1994) and Associate Editor (1994-present) of Physical Review A; APS Fellow (1995). He serves as Director of the Los Alamos Summer School (1992-present), a program aimed mainly at undergraduates, and as an Adjunct Professor at the University of New Mexico (1992-present). He has also been a member of the APS Fellowship, Nominating, and Executive Committees of GFB, the Executive Committee of the Forum for Physics and Society, and the Education Committee of the Division of Atomic, Molecular, and Optical Physics.

His research has spanned a diverse set of areas including astrophysics; heavy-particle collisions; scattering of electrons from atoms and molecules; molecular structure; interaction of matter with radiation - photoionization, intense field interactions, and quantum control; computational physics; and quantum mechanical many-body treatment of dense liquids and plasmas as well as ultracold media.

### STATEMENT

The strength of the Topical Group rests with its interdisciplinary nature and its promotion of basic ideas across a diverse set of fields. This promotion has effectively occurred through the Newsletter, Webpage, organized symposia, prizes, APS Fellow appointments, and contacts through other organizations. These avenues should continue to receive vigorous support, and others opened to gain wider recognition. Looming over all these activities is the question of the continued status of the Group given its membership hovering around the APS threshold. I shall work closely with the Executive Committee to mount a vigorous effort at recruiting. These efforts can serve a dual role of gaining new members and extending the exposure of the Group. Such projects might include overtures to sub-groups in other fields not strongly associated with few-body problems and to the international APS membership. In addition, more participation in educational initiatives should prove stimulating and productive.

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# Charlotte Elster

## Ohio University

### BIOGRAPHY

Professor of Physics, Ohio University.  
Ph.D. 1986, University of Bonn,  
Postdoctoral Research at Kent State University (1986-87),  
University of Maryland (1987-88),  
The Ohio State University (1988-91),  
Asst. Prof. 1991-96, Assoc. Prof. 1996-2002, Prof. 2002-present.  
Senior Research Scientist, Forschungszentrum Juelich (FZJ) 1999-2002.

Fellow of the APS 2001, Battelle Fellow, Battelle Memorial Institute 1988-89.  
Scientific Secretary, Co-Organizer of the 2002 Quark Nuclear Physics Conference QNP2002.

Executive Committee APS Division of Nuclear Physics 2001-2002,  
Program Committee Neumann Institute for Computing (FZJ) 2001,  
Chair of PAC Committee IUCF 1998-99, PAC Committee IUCF 1997-2000,  
Executive Committee APS Few Body Topical Group 1996-98,  
Chair of Statewide Users Group at Ohio Supercomputer Center 1996-98,  
Member of APS Committee on the Status of Women 1992-95.

Research Interests:

Scattering of nucleons from very light nuclei in the intermediate energy range. Investigations of relativistic effects in few-body and many-body dynamics and the role of subnuclear degrees of freedom. Effective field theories, especially models for the nucleon-nucleon, nucleon-nucleon-pion, and pion-nucleon system derived from hadronic field theories, pion production in nucleon-nucleon scattering. Computational physics with emphasis on nuclear reactions and few-body systems.

## STATEMENT

Few-body physics plays an important role in a host of exciting forefront topics in physics. Working on few body problems can bridge between different subfields of physics like atomic, molecular, nuclear, particle and computational physics. The symposia and meetings organized by the topical group provide excellent means of communication between physicists working in the different areas on different phenomena yet using similar methods and concepts.

I would like to see especially the younger members, postdoctoral researchers and graduate students actively involved in the few body community, having stimulating discussions about the most recent research topics.

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## CANDIDATES FOR EXECUTIVE COMMITTEE

### Ben Gibson

#### Los Alamos National Laboratory

##### BIOGRAPHY

Technical Staff Member, Los Alamos National Laboratory , 1972--; Group Leader, 1982-86;

B.A. Rice Univ., 1961; Ph.D. Stanford Univ., 1966;

Post Doctoral Fellow, LLNL, 1966-68;

NRC Research Assoc., NBS Gaithersburg, 1968-70; Research Assoc., Brooklyn College of the CUNY, 1970-72.

APS Fellow, 1983; JSPS Research Fellow, Tohoku Univ., 1984; Murdoch Fellow, INT, 1992; Humboldt Research Award for Sr. U.S. Scientists, Juelich, 1992--.

DOE Users Review Panel, 1983; NSAC Subcomm. on Computers and Computing, 1984-85; Bates PAC, 1985-89; LAMPF PAC, 1993; NSF Review Panel for IUCF, 1993;

Few-Body Systems Topical Group Vice-Chair, Chair Elect, and Chair, 1990-93;

DNP Program Comm., 1990-92, Natural Sciences and Engineering Research Council of Canada, Subatomic Physics Grant Selection Committee, 1994-96;

NSF Nuclear Theory panel, 1997-98; LANSCE PAC, 1998, 2000-2002; Bates PAC, 1998--. Editorial Board of `Physical Review C', 1978-79, 1987-88; Editorial Board of `Few Body Systems', 1986--; Assoc. Editor of `Physical Review C', 1988-2002; Sr. Editor of `Physical Review C', 2002--. Org. Comm. for the 1989 DNP Fall Meeting; Local org. for the 1989 DNP Light Hadronic Probes Town Mtg; Co-org. of New Vistas in

Physics with High Energy Pion Beams, 1989; Prog. Chair of the 1993 APS April Mtg; Co-org of Properties and Interactions of Hyperons, 1993; Org. Comm. for Barons '95; Org. Comm. for LUGI Symp: 20 Years of Meson factory Physics, 1996; DNP Sec-Trea. 1995 --.

Research interests: few-baryon systems, hypernuclei, electromagnetic interactions, paritynonconservation, hadron structure.

#### CANDIDATE'S STATEMENT

Few-body physics plays an important role in numerous forefront areas of physics. The Few-Body Systems and Multiparticle Dynamics Topical Group (GFB) should work to communicate a sense of excitement about these topics through the sessions it organizes at APS meetings. In addition, close contact and cooperation with other APS units should be used to highlight exciting few-body results in all areas of physics.

Encouraging contributed papers at APS meetings would promote participation and increase the influence of the GFB in such meetings.

My past experience in working with the APS through the GFB and DNP should be an asset in promoting these goals.

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## David Ernst

### Vanderbilt University

#### BIOGRAPHY

David Ernst's research interests center on the question of the quark-gluon structure of the neutron and proton as well excited hadronic states. He also works on the phenomenology of neutrino oscillations.

He is presently a Professor of Physics, Chair of the Department of Physics and Astronomy, and Alexander Heard Distinguished Service Professor at Vanderbilt University. He received his PhD in 1970 from MIT. He was an assistant professor and then professor at CINVESTAV, Mexico, from 1970-1972; a postdoc and instructor at Case Western Reserve 1972-1975; assistant professor, associate professor, and professor at Texas A&M University 1975-1992; and has served as Chair of Physics and Astronomy, Associate Dean for Research of the College of Arts and Science, and Director of the W. M. Keck Foundation Free Electron Laser Center at Vanderbilt University since moving there in 1992. He has spent sabbaticals as Visiting Assistant Professor at the University of Washington 1979-1980 and Visiting Scientist at the Jefferson Laboratory 2000-2001. He is also presently Past Chair of the Board of Trustees of the Southeast Universities Research Association and has been a member of the Board since 1992; Administrative Executive Officer of the National Society of Hispanic Physicists; Alternate Representative to the Council of Presidents of the University Research Associates; and member of the International Advisory Committee of the World Laboratory Center for Pan-American Collaboration in Science and Technology.

He is a Fellow of the American Physical Society, where his service includes the Nuclear Division Program Committee 1983-1985; Vice Chair, Chair-Elect, Chair, and Past Chair of the Forum on International Physics 1998-2002; member and Chair of the Committee on International Scientific Affairs 1998-2002; member of the Executive Committee of the Southeast Section 2000-2003; Bouchet Award Committee 2000-2001; Wheatley Award Committee 2002-2004; and has served on the fellowship selection committee for the Few Body Topical Group and the Forum on International Physics.

#### CANDIDATE'S STATEMENT

Few-body physics is a topic that cuts across all the sub-disciplines of physics. The role of the Few-Body Group is to identify common threads that interconnect these sub-disciplines and to promote interchange while organizing sessions and otherwise publicizing the exciting forefront results emerging from contemporary

few-body physics.

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## **Mike Lieber**

### University of Arkansas

#### BIOGRAPHY:

Michael Lieber received a B.A. degree in Physics from Cornell University (1957) and an M.A. from Harvard University (1958). After spending several years in industry as a mathematician, he completed his Ph.D. at Harvard (1967) under the supervision of the late Julian Schwinger. He then became a post-doc at New York University where he first became enamored of the few body problem while working with Larry Spruch and Leonard Rosenberg. In 1970 he joined the faculty at the University of Arkansas as Assistant Professor of Physics, and has remained there, serving in many capacities, including department chairman. He was a visiting member of the Institute for Theoretical Physics at Santa Barbara. This is his first opportunity to serve the APS, an obligation, which is long overdue.

His research interests have been varied but most often related to the three-body problem. He has developed a version of the Kohn variational principle applicable to three-body breakup problems in the nuclear physics domain, and studied various techniques for the atomic physics (Coulomb) case, including the eikonal and several varieties of Born approximations. He has developed asymptotic forms for the three- Coulomb continuum wave function with improved accuracy compared with prior forms, and is currently extending the technique to the bound state problem. In studying the problem of electron capture at high energies, he devised what has become known as the Lieber diagram for analyzing the kinematics of the capture process, and together with a graduate student, discovered surprisingly rich structure in the so-called "forbidden zone" of that diagram.

#### CANDIDATE'S STATEMENT:

The few-body problem is unusual in that it cuts across almost the complete spectrum of modern physics, from chemical interactions to the quark structure of matter. This cross-disciplinary nature of our subject is the source of both the strength and weakness of the Topical Group in Few-Body Physics. Certainly no subject could be more relevant to so many subfields of physics. But as a result, the Topical Group has a more horizontal nature, as compared with the more vertical nature of the groups and divisions of APS servicing the individual subfields. As I am a member of DAMOP, DPF and DCOMP, the Few-Body group has had in the past a secondary nature for me, and I am sure for many others. As a result, we have not had the prominence within APS I believe we deserve.

I believe that we can strengthen the group and increase its membership by improving our visibility at APS national, regional (sectional) and divisional meetings.

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## **A. Ravi P. Rau**

### Louisiana State University

#### BIOGRAPHY

A. Ravi P. Rau got his B.Sc.(1964) and M.Sc.(1966) degrees from the University of Delhi, India, and his Ph.D. in theoretical atomic physics from The University of Chicago in 1970. After postdoctoral work at New

York University (1970-2), he was at the Tata Institute for Fundamental Research, Bombay, India (1972-3), before joining Louisiana State University in 1974 where he is currently a Professor of Physics and Astronomy. He has been a sabbatical visitor at the Raman Research Institute, Bangalore, India; JILA, Boulder; Australian National University, Canberra; University of Bielefeld and University of Freiburg, Germany.

He is a Fellow of the American Physical Society, has been an Alfred P. Sloan Foundation Fellow (1977-80), and had a Humboldt Award for Senior Scientists (1999-2000).

His interests are in phenomena due to the simultaneous action of two or more equally strong forces on a particle. In atomic and optical physics, such situations arise when external electric or magnetic fields compete with the internal Coulomb force in controlling the electron's motion. Doubly and multiply excited states of atoms provide another example, the forces between the electrons then being comparable to the attraction each feels from the nucleus. A closely related problem is that of three-body threshold behavior with Coulomb forces when two slow electrons escape from a positive charge. Currently, he is working on time-dependent phenomena such as the interaction of intense lasers on atoms, the external electric field of the laser now time dependent as well. Also, in the fields of quantum computation and quantum information, two or more qubits may be coupled together and to the external environment through time-dependent fields. The quantum time-dependent operator equations for such problems, including incorporation of dissipation and decoherence effects, are

being investigated through a novel method for solving such operator equations. Among other publications are two books with U. Fano: Atomic Collisions and Spectra (1986) and Symmetries in Quantum Physics (1996), and a recent book: Astronomy-inspired Atomic and Molecular Physics (Kluwer, 2002).

#### CANDIDATE'S STATEMENT

One of the appealing aspects of physics to me is the coherence and unity across its various subdisciplines. The few-body problems that interest us arch across nuclear, atomic, chemical and condensed matter physics. The same ideas and techniques apply and thereby unify our fields. Our topical group is, therefore, the natural one to highlight this aspect of physics, particularly for graduate students and younger members of our society. I see, therefore, a primary activity for our group being the organization of exciting sessions at national meetings of the American Physical Society that will bring out this theme.

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