

# **FEW-BODY SYSTEMS AND MULTIPARTICLE DYNAMICS NEWSLETTER**

## **February 1998**

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### **MESSAGE FROM THE CHAIR**

Greetings to all members of the Topical Group. It is time to elect officers again, and I hope that all of you will take a few minutes to vote. I would like to thank the members of the Nominating Committee, Chris Greene, Henry Weller, Bob Wyatt, and Bill McCurdy, for their efforts in putting together an outstanding slate of candidates. The candidates, a short biography of each, and a statement of their goals in office are listed below. We have attempted to provide candidates from the many disciplines that comprise our group. It is this multi-disciplinary aspect that is our reason for being. Our topical group has members from atomic, molecular, nuclear, mathematical, chemical, particle .... physics. Please vote for the new leadership that will continue our partnership.

We have some good news from the APS. After years of declining membership, we increased approximately 10 percent in 1996 and this should be stable in 1997. Ken Kulander, Franz Gross, and previous officers deserve credit for this expansion. We have tried to increase the visibility of the group, and it seems to have paid off. If anyone has suggestions for further enhancements, please contact any of the officers. Encourage your colleagues to join.

Our World Wide Web site (located at <http://qmc.lanl.gov/fewbody>) continues to function, and this is the best source of current information about the group. We have the group statement of

purpose, the bylaws, a complete list of officers and committee members, a list of the group's APS Fellows for the previous few years, previous newsletters (thanks to Carl Carlson), meetings of interest, links to related organizations, and useful sites. Our Picture Gallery has not done particularly well. If you have interesting or pretty graphics to display please contact me. The APS program and room assignments at the Spring Meeting solidify fairly late, so please check the Web for the latest information, particularly concerning the group's annual business meeting.

Spring approaches and that means that we will convene our annual gathering in Columbus, OH during April 18-21, 1998. This is the primary group activity. Colston Chandler and his committee comprised of Don Kouri, Steve Lundeen, Michael Cavagnero, in coordination with Dennis Skopik have put together a very interesting and diverse program that is listed below. Colston has arranged that each of four sessions be held jointly with another division or topical group, and this arrangement reflects our multidisciplinary interests. I hope that you will be able to attend.

Finally, we have a new APS Fellow who was nominated by the group. Congratulations to Michael Fuda. Our thanks to the Fellowship Committee: Colston Chandler (Chair), Carl Carlson, and David Hoffman.

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## **ELECTIONS**

Enclosed is your ballot for our 1998 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 following the Topical Group's Business Meeting, which will be held during the Spring Meeting.

The present officers are Ken Kulander, Past-Chair; Jim Friar, Chair; Colston Chandler, Chair-Elect; Barry Schneider, Vice-Chair; Carl Carlson, Secretary-Treasurer. The executive committee members are: Carl Carlson (98), Jim McGuire (98), Charlotte Elster (99), Bob Wiringa (99), Peter Mohr (00), and Steve Cotanch (00).

Please mail your ballot to be received before the 13 March DEADLINE.

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## **APS FELLOWSHIP NOMINATIONS**

One major benefit to the members of the topical group is that we can nominate members of the group to become Fellows of the Society. The number of nominations we are able to put forward depends on our total membership. The choice of our candidate(s) from among those nominated

will be made by our current Fellowship Committee: Barry Schneider (chair), Lee Collins, and Dick Drachman.

Information regarding the procedure and a nomination form can be easily obtained through the APS home page ([www.aps.org](http://www.aps.org)) or our own (under Fellows). The DEADLINE for nominations for our Topical Group is 1 April 1998. Please make sure the full package has been submitted to the APS before this date.

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## SPRING MEETING

The 1998 APS Spring Meeting will be held 18-21 April (Friday-Monday) in Columbus, Ohio. There will be four invited FBSTG sessions, all held jointly with other APS groups, and one session of contributed papers (held jointly with Precision Measurements). The annual business meeting will also be held. Many thanks to the organizers and to Bill Parke (GWU) for attending to scheduling.

The schedule, including session numbers and times, is currently as follows. We hope these sessions prove interesting to you, and we invite your comments and suggestions (addressed to Colston Chandler, [chandler@unm.edu](mailto:chandler@unm.edu)).

**(1) Few-Body Systems & Precision Measurements: contributed papers [C21, Saturday, 18 April 1998, 11:00 am]**

**(2) New Results in Few-Body Physics (jointly with DNP) [D16, Saturday, 18 April 1998, 2:30 pm]**

Organizer: D. M. Skopik, Saskatchewan Accelerator Laboratory

Chairperson: W. T. H. van Oers, University of Manitoba

- H. Weller, TUNL, "Precise determination of the doublet/quartet cross sections in p-d radiative capture at near thermal energies and a comparison to 3-body calculations which include MED effects"
- W. Leidemann, Universita Degli Studi di Trento, "Lorentz transforms and the exact calculations of few-body response functions"
- M. Sevier, The University of Melbourne, "New results for the  $\pi - p = \pi \pi N$  reaction"
- R. Igarashi, Saskatchewan Accelerator Laboratory, "Measurement of the  ${}^2\text{H}(\gamma, \pi^0)$  reaction near threshold"

**(3) FBTG Business Meeting [E16, Saturday, 18 April 1998, 5:00 pm]**

**(4) Precision Studies of Few-Body Systems (jointly with FCPMTG) [H17, Sunday, 19 April 1998, 11:00 am]**

Organizers: C. Chandler, University of New Mexico; S. R. Lundeen, Colorado State University

Chairperson: Gerald L. Payne, University of Iowa

- J. F. Babb, Harvard-Smithsonian Center for Astrophysics, "The one-electron diatomic molecule: New theoretical developments"
- E. A. Hessels, York University, "High precision measurement of the  $2^3P_0 - 2^3P_1$  interval in helium: Progress towards a new measurement of the fine structure constant"
- D. Hüber, Los Alamos National Laboratory, "Can the  $A_y$  puzzle be solved by reasonable changes in the nuclear forces?"
- B. von Przewoski, Indiana University Cyclotron Facility, "Proton proton scattering with polarized beam and polarized target at the Indiana Cooler"

### **(5) Interpolation and Approximation: New Advances for Multidimensional Problems (jointly with DCP) [I19, Sunday, 19 April 1998, 2:30 pm]**

Organizer: D. J. Kouri, University of Houston

Chairperson: C. Chandler, University of New Mexico

- D. J. Kouri, University of Houston, "Distributed Approximating Functionals, wavelets and digital approaches to problem solving"
- G. H. Gunaratne, University of Houston, "Solving nonlinear PDEs using Hermite DAFs"
- G. Wei, University of Houston, "Wavelet-DAFs and their applications"
- D. K. Hoffman, Iowa State University, "DAF filtering of signals and digital information"

### **(6) Exotic Atoms (jointly with DAMOP) [M10, Monday, 20 April 1998, 11:00 am]**

Organizers: C. Chandler, University of New Mexico; M. J. Cavagnero, Harvard-Smithsonian Center for Astrophysics

Chairperson: to be announced

- F. J. Hartmann, Technische Universität München, "A survey of recent experiments with exotic atoms"
- D. S. Armstrong, College of William and Mary, "Radiative muon capture on the proton and muonic molecular effects"
- G. Marshall, TRIUMF, "Muon catalyzed fusion in solid hydrogen"
- J. Cohen, Los Alamos National Laboratory, "Molecular effects on antiproton capture"
- A. Olin, TRIUMF, "Kaonic hydrogen X-rays"

## **ELECTION CANDIDATES**

For Vice-chair:

- Lee Collins
- Dennis Skopik

For Executive Committee;

- Greg Ezra
- Jerry Feldman
- Jeff Krause
- John Morgan

For Secretary-Treasurer:

- Carl Carlson [incumbent]

## **VICE-CHAIR**

LEE COLLINS has been a staff scientist in the Atomic and Optical Theory Group at the Los Alamos National Laboratory since 1977. He received a Ph.D. degree from Rice University in 1975 with Neal Lane and has held postdoctoral and visiting scientist positions at JILA and the Daresbury Laboratory(England). 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); and Los Alamos Research Achievement Awards. He serves as Director of the Los Alamos Summer School in Atomic, Molecular, and Optical Physics(1992-present), a program aimed mainly at undergraduates, and as an Adjunct Professor at the University of New Mexico(1992-present). He is also on the APS Fellowship Committee of FBSMD Topical group and on the Local Program and Organizing Committees for the 1998 DAMOP meeting. 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.

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, organized symposia, prizes, APS Fellow appointments, and contacts through other organizations. These avenues should continue to receive vigorous support. Extensions to our Web page, such as additional features and links, can provide even greater communication channels - for example, a simple, updated list of timely papers might provide a valuable resource. Building on the success of the Spring Meeting symposia, we should increase our participation in joint endeavors at other divisional, national, and international meetings. Also, few-body problems play crucial roles in areas that might, at first, seem remote from the basic concerns of this Group such as plasmas, condensates, and materials. Extending contacts with relevant sub-fields of these disciplines could prove fruitful. Finally, actively participating in new APS initiatives aimed at broader expert and lay audiences might help further promulgate the multifaceted, fascinating nature of the few-body problem.

DENNIS M. SKOPIK is the Director of the Saskatchewan Accelerator Laboratory and a Professor of Physics in the Department of Physics and Engineering Physics at the University of Saskatchewan. He received his B.Sc. in Physics and Mathematics at the Defiance College in Defiance, Ohio, 1963; an M.Sc.(Physics) at the College of William & Mary College, Williamsburg, Virginia (1965), and a Ph.D.(Nuclear Physics) at the American University, Washington, D.C.(1970). He was a visiting scientist at the Triangle Universities Nuclear Laboratory (1976) and the National Bureau of Standards (1982). He serves or has served as: Chairman of program organizing committee for Nuclear Physics for CAM (a joint meeting of the Canadian, American and Mexican Physics Societies) (1995), in Quebec City; Chairman, Division of Nuclear Physics, Canadian Association of Physicists (1994-1996); Executive Committee Member, Canadian Institute for Synchrotron Radiation (1994 - present); Member of the Program Advisory Committee for Bates Linear Accelerator Center, Middleton, MA (1993-1997); Member of the Board of Trustees, Canadian Institute for Synchrotron Radiation (1993-present); Treasurer, Canadian Institute for Synchrotron Radiation (1991-1994); Member of the Nuclear Physics Review Panel for the Department of Energy, Washington, D.C. (1993); Chairman, Gordon Research Conferences, Tilton, New Hampshire (1992); Chairman of the Program Advisory Committee for MAX-Lab, University of Lund (1992-present); Program Committee Member for the American Physical Society DNP (Division of Nuclear Physics) (1991-1993 and 1996-present). He is a member and fellow of the American Physical Society, the Canadian Association of Physicists and the Canadian Institute of Synchrotron Radiation.

STATEMENT: Studies of few-body systems embrace disciplines ranging from molecular to sub-atomic physics. This wide range, as a consequence, encompasses many disparate fields: particle physics, nuclear physics, chemistry, astrophysics, atomic and molecular physics. The Few Body Topical Group has an important role to play in bringing together researchers in these areas. I will work to promote the Few Body Topical Group among these varied groups in North America and abroad.

## **EXECUTIVE COMMITTEE**

GREGORY EZRA was born in London, England. He received his undergraduate and graduate degrees in chemistry from Oxford University. After obtaining his D.Phil. in 1980 with P.W. Atkins, he went to the University of Chicago as a NATO postdoctoral fellow to work with R.S. Berry. He then joined the chemistry department at Cornell University, where he is now Professor. Dr. Ezra has received Sloan and Dreyfus fellowships, and in 1988 was awarded the Medal of the International Academy of Quantum Molecular Science. He currently serves on the editorial boards of the Journal of Nonlinear Science and the Journal of Mathematical Chemistry, and is a member of the graduate field of Applied Mathematics at Cornell. Dr. Ezra's research has covered many aspects of the few-body problem in chemistry and physics: symmetry properties of floppy molecules; electron correlation in multiply-excited atoms; semiclassical quantization of coupled oscillators systems; semiclassical periodic orbit analysis of atomic and molecular spectra; classical dynamics of the 3-body Coulomb problem. He has organized interdisciplinary workshops on "Classical and Quantum Transport in Hamiltonian Systems", "Dynamical Problems in Theoretical Chemistry", and on "Symmetry, Frames and Geometric Phases in Atomic and Molecular Physics".

GERALD FELDMAN is currently an Assistant Professor in the Department of Physics at The George Washington University (GWU). He received his Ph.D. in experimental nuclear physics from the University of Washington in 1987 and then spent 3 years as a Research Associate at the Triangle Universities Nuclear Laboratory (TUNL). In 1990, he took a position as a Research Scientist at the Saskatchewan Accelerator Laboratory (SAL), where he remained until 1996, when he moved to GWU. His research interests in intermediate-energy nuclear physics include Compton scattering on nucleons and nuclei, photodisintegration of light nuclei, photoproduction of pions, and development of polarized photon beams.

STATEMENT: The FBS Topical Group serves as a focal point for contact among researchers in diverse subfields of physics. The Group provides a forum for the exchange of ideas, techniques and results across fields, offering a broader perspective of few-body physics as a whole. The Group should strengthen its efforts to bring together physicists from various disciplines through symposia at APS meetings and sponsorship of focused topical conferences and workshops. The Group should also actively encourage (and financially support, if possible) younger researchers in the various subfields to attend meetings where they can also broaden their experience. Lines of communication should be maintained, such as the FBS Newsletter and the ongoing development of the WWW site, and other resources should be instituted as well, such as an FBS Topical Group e-mail directory. Increasing the visibility of the Group and enhancing interactions within the Group should be a primary objective for the future.

JEFFREY L. KRAUSE, Department of Chemistry and Quantum Theory Project, University of Florida. Ph.D., University of Chicago, 1986. Postdoctoral Researcher, Weizmann Institute of Science, 1987-88. Physicist, Lawrence Livermore National Laboratory, 1989-92. Assistant Scientist, University of California, San Diego, 1992-94. Assistant Professor, University of Florida, 1995-present. RESEARCH INTERESTS: Time-dependent quantum mechanics; quantum control of atoms, molecules and semiconductors; Rydberg atoms; interaction of intense laser fields with atoms and molecules; ultrafast spectroscopy.

STATEMENT: Few-body systems pose a unique set of theoretical and experimental problems that cross the conventional boundaries of physics, chemistry and mathematics. The Few-Body Systems Topical Group brings together researchers from diverse areas, with common objectives and methods. This provides opportunities for communication, cross-fertilization and collaboration that would not otherwise exist. As someone whose research falls on the boundary between chemistry and physics, I would seek to encourage younger scientists to explore the pleasures and challenges of interdisciplinary research. I would also strive to increase our ties to the theoretical chemistry community, and to enhance our presence at national meetings and on the web.

JOHN D. MORGAN III obtained a B.S. in Physics, Chemistry, and Mathematics from the George Washington University in 1974, an M.Sc. in Theoretical Chemistry from Oxford University in 1978, and a Ph.D. in Chemistry from the University of California at Berkeley in 1978. From 1978 until 1981 he was a postdoctoral fellow and lecturer at the Dept. of Physics, Princeton University. From 1981 until the present he has been in the Dept. of Physics and Astronomy at the University of Delaware, where he was promoted to tenure in 1986. He has been a visitor in the Dept. of Chemistry at the U. of Chicago (1985), the Dept. of Chemistry and

the Institute for Theoretical Atomic and Molecular Physics at Harvard University (1988-1990 and 1992), the Institute for Nuclear Theory at the University of Washington (1993), the Dept. of Classics at Harvard University (1993), the School of Historical Studies of the Institute for Advanced Study (1994), and the Cornell Theory Center (1995). He has been awarded a Marshall Scholarship (1974-76), a Chaim Weizmann Postdoctoral Fellowship (1978-80), an NSF National Needs Postdoctoral Fellowship (1980-81), a NIST Precision Measurement Grant (1987-1990), and an NEH Fellowship (1993). He has served as Associate Editor of the Journal of Mathematical Physics (1985-87) and is currently on the Advisory Editorial Board of the International Journal of Quantum Chemistry (1995-present). He has served as a counsellor to the Few-Body Topical Group (1989-92), and under its auspices organised a workshop on 'The Atomic/Nuclear Frontier' attached to the May 1993 DAMOP meeting in Reno.

STATEMENT: The Few-Body Topical Group plays an important role in bringing together APS members from different divisions, and thereby tends to counteract the fragmentation of the APS into its several divisions, and the further splintering of divisions into more specialised subunits. To promote our cross-disciplinary approach to physics, we should continue and even intensify our efforts to have sessions sponsored or co-sponsored by our topical group included in the program of the annual meetings of the APS divisions. At minimal additional cost to attendees, we can also organise 'satellite' workshops, featuring about a dozen speakers, immediately before or after APS divisional meetings, such as the one I organised in Reno in 1993. By carefully choosing speakers who will make well-organised presentations of recent results in exciting fields, we can stimulate other conference attendees to join our topical group.