

FEW-BODY SYSTEMS AND MULTIPARTICLE DYNAMICS NEWSLETTER

February 1997

MESSAGE FROM THE CHAIR

It is time to choose the officers for our Topical Group who will lead us to the edge of the next millennium. In this first newsletter of 1997 we present the candidates for the election of those who will serve into the year 2000. Interdisciplinary research continues to become increasingly important in the physical sciences and our Topical Group can be a leader in developing and implementing ways to enhance communication among diverse fields which have mutually shared fundamental interests. Please consider the excellent slate of candidates carefully, make your selections on the enclosed ballot and return it by 28 February 1997.

Traditionally the FBSTG holds its annual gathering at the Spring meeting of the American Physical Society. This year this will take place in Washington, DC, 18 - 21 April 1997. The meeting is being held jointly with the American Association of Physics Teachers along with the Physical Societies of Canada and Mexico. A list of the speakers and titles of the FBSTG symposia is given below. Jim Friar has chaired our Program Committee and we are grateful to him and to the other session organizers, Peter Mohr, Jim McGuire and Steve Berry, for putting together an outstanding list of talks. Especially interesting will be Professor Ted Haensch's talk on his remarkable new measurements on hydrogen. I think the talk should be more accurately called "double-precision" spectroscopy. Don't miss it. In fact, all the scheduled talks will be well worth your time and we would like to see large audiences in every session.

Last year Jim Friar set up an excellent web page for the Topical Group with lots of valuable information for our members. This will become a major resource for FBSTG and we all should make use of it not only by reading it but in contributing to it with meeting and job announcements, pictures and links to other useful sites, etc.

As decided at the last business meeting, we will be sponsoring a prize for the outstanding thesis in Few-Body science as soon as support can be established. Any ideas about sources of funding would be greatly appreciated. Send suggestions to kulander@llnl.gov.

Finally, note that the deadline for nominations for APS fellowship through our Topical Group is 1 April 1997. You can check out the list of group members in the back of the APS membership directory to see which of your worthy colleagues you might want to nominate. While you are looking, if you notice a colleague who should be a member of FBSTG, but apparently has passed up the chance to join, you might encourage him or her to consider becoming a member. The larger our membership, the more Fellows we can sponsor.

ELECTIONS

Enclosed is your ballot for our 1997 election of officers. We will elect a Vice-Chair, a Secretary-Treasurer and two members of our Executive Committee. The Vice-Chair serves a term of one year, then becomes Chair-Elect the next year and 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 at the Spring Meeting (tentatively scheduled for Sunday night; consult the final program on our WWW site). The present officers are Franz Gross, Past-Chair, Ken Kulander, Chair, Jim Friar, Chair-Elect; Colston Chandler, Vice-Chair; Don Kouri, Sec.-Treas.; Jerry Payne (97), Don Lehman (97), Carl Carlson (98), Jim McGuire (98), Charlotte Elster (99) and Bob Wiringa (99), the Executive Committee. The candidates' short bios and campaign statements are included in this letter. We have a strong and enthusiastic slate of candidates and your votes are important to ensuring a representative group of Officers. Mail your ballot to be received before the 28 February DEADLINE.

TOPICAL GROUP WEB PAGE

The Few-Body Systems Topical Group now has its own World Wide Web page located at <http://qmc.lanl.gov/fewbody/>. In addition to listings of the group's statement of purpose, group bylaws, and group officers and committee members, we list meetings of interest to group members, citations for the group's new APS fellows, previous newsletters (thanks to Carl Carlson), links to related organizations, and a "picture gallery", suggested by Charlotte Elster. The picture gallery contains color graphics depicting few-body problems. Anyone wishing to make a contribution to the gallery (nice graphics rather than content should be the primary motivation) should contact webmaster Jim Friar. We hope that the list of meetings, containing in some cases titles and schedules of talks, will prove useful. The latest information on the four sessions at the Spring Meeting will be displayed and can be conveniently printed.

Any suggestions, additions, or corrections for the Web page are welcome at: friar@sue.lanl.gov.

SPRING MEETING

The Spring Meeting will be held in Washington from April 18-21 (Friday-Monday). It will feature four FBSTG sessions, three of them held jointly with other APS groups. One session will be devoted to electromagnetic interactions in hadronic systems and the ways that effective field theories of the strong interactions are helping our understanding of these systems. Sometime this spring the fundamental constants will be updated for the first time in a decade. Peter Mohr (NIST) suggested that a set of talks outlining some of the physics in this endeavor would be timely, and this has been arranged. Atomic correlations in various guises form the basis of the third session (our thanks to Jim McGuire). The disparity in scales in atomic, molecular, and nuclear systems (and, paradoxically, the similarity in some of the physics) forms the basis for the fourth session (an idea of Steve Berry).

We hope that these sessions prove interesting to the group, and thank those who helped organize them. The sessions as currently constituted are given below.

**(1) Electromagnetic Interactions and Effective Field Theories (jointly with DNP)
[Sunday 2 PM; Chair: J. Friar]**

- M. Rho, Saclay, "Meson-Exchange Currents"
- U. van Kolck, U. Washington, "Electromagnetic Interactions and Isospin Violation in the Nuclear Force"
- M. Ramsey-Musolf, U. Connecticut, "Nucleon Strangeness: How Effective is Effective Theory?"
- J. Bergstrom, U. Saskatchewan, "Probing Chiral Symmetry at SAL"

(2) Simple Systems and the Fundamental Constants [Sunday 11 AM ; Chair: P. Mohr]

- D.W.L. Sprung, McMaster Univ., "Nuclear Effects in Precision Atomic Measurements"
- W.J. Marciano, BNL, "The Muon Anomalous Magnetic Moment"
- J.R. Sapirstein, U. Notre Dame, "Helium and Positronium Fine-Structure Calculations"
- T.W. Haensch, MPI f. Quantenoptik, Garching, "Precision Spectroscopy of Hydrogen and Fundamental Constants"

**(3) Few- and Many-Body Effects in Atomic Systems (jointly with DAMOP)
[Saturday 2:30 PM; Chair: J. McGuire]**

- Eugene Stanley, Boston U., "Long-Range Correlation and Scale Invariance in Complex Systems"
- Andre Mysyrowicz, Ecole Polytechnique Palaiseau (Paris), "Bose- Einstein Condensation in Dense Low-Temperature Biexcitons"
- Wuchun Wu, Lawrence Berkeley Laboratory, "How Do Two Electrons Talk To Each Other In Atomic Collisions"
- Ravi Rau, LSU, "Saddle Dynamics in Few-Body Potentials"

(4) Correlation at Three Scales: Nuclei, Atoms and Molecules (jointly with DCP) [Friday 8 AM]

- R. Stephen Berry, The University of Chicago, "Collective and Independent-Particle Motion of Electrons in Atoms"
 - Michael E. Kellman, The University of Oregon, "Collective and Independent-Particle Motion of Atoms in Molecules"
 - Witold Nazarewicz, Oak Ridge National Laboratory and the University of Tennessee, "Collective and Independent-Particle Motion of Nucleons in Nuclei"
 - Round Table Discussion -- Speakers to be determined
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APS FELLOWSHIP NOMINATIONS

One major benefit to the members of the topical group is the possibility of nominating a member of the group to become a Fellow of the Society. The number of nominations we will be able to put forward depends on our total membership. The choice of our candidate(s) from among those nominated will be made by our Fellowship Committee which is chaired this year by Colston Chandler (chandler@unmb.unm.edu). Information regarding the procedure and a nomination form can be easily obtained through the APS home page (www.aps.org). The DEADLINE for nominations for our Topical Group is 1 April 1997. Please make sure the full package has been submitted to the APS before this date.

ELECTION CANDIDATES

VICE-CHAIR

JOHN B. DELOS B. S. (Chemistry), University of Michigan, 1965; Ph.D. (Physical Chemistry), Massachusetts Institute of Technology, 1970. Professor of Physics, College of William and Mary, Williamsburg VA 23187; Research Associate - University of British Columbia - 1970-1971; Assistant, Associate, Full Professor - College of William and Mary 1971-Present; Visiting Research Scientist, FOM Institute, Amsterdam, 1979-1980; Consultant, Naval Surface Weapons Center, 1981; Visiting Fellow, JILA, 1986-87; Visiting Scientist, Harvard-Smithsonian Center for Astrophysics, 1992; Visiting Fellow, JILA, 1994-1995. Fellow of the American Physical Society; Outstanding Scientist of Virginia 1990. Board of Directors, Telluride Summer Workshops in Theoretical Chemistry 1988; Program Committee, Division of Atomic, Molecular and Optical Physics (DAMOP), American Physical Society, 1988-1990; DAMOP Executive Committee, 1992-93; Co-organized and -chaired Workshop on Quantum Chaos and Atomic Physics at Harvard- Smithsonian Center for Astrophysics 1993; Co-organized Symposium on Chaos at DAMOP-APS Divisional Meeting, 1993; Co-organizer of Workshop on Classical Orbits and Interferences in Designer Atoms, Harvard-Smithsonian Center for Astrophysics, April 1997.

STATEMENT: The Topical Groups of the APS play an important role in the advancement and diffusion of knowledge in physics. Whereas most of our conferences are organized around the Divisions (Astrophysics, Atomic, Biological,...), the Topical Groups cut across the divisional boundaries. One of the pleasures of work in my own area (chaotic dynamics) lies in seeing similar ideas developed and applied in many different fields, from plasma dynamics to nanostructures to molecular vibrations to atomic spectra to models of the nucleus. Our primary role in organizing Few Body symposia and workshops is to continue to ensure communication and cross-fertilization among the various areas of physics.

BARRY I. SCHNEIDER is currently Program Director for Theoretical Physics and Program Director for Atomic, Molecular, Optical and Plasma Physics in the Physics Division of the National Science Foundation. Previous to his appointment at the NSF, he spent twenty years in the Theoretical Division of Los Alamos National Laboratory as a staff member in the Theoretical Chemistry and Molecular Physics Group. He received his BS in chemistry from Brooklyn College in 1962, an MS in chemistry from Yale University in 1964 and the Ph.D. in theoretical chemistry under the direction of Professor R. S. Berry from the University of Chicago in 1968. During the 1969 academic year he was a postdoctoral researcher at the University of Southern California with Professor Howard Taylor. He has published numerous articles on the scattering of electrons from atoms and molecules, atomic and molecular photoionization, molecular structure and many-body theory. Other research interests include computational physics and chemistry and numerical analysis. Schneider is a Fellow of the American Physical Society, recipient of a Poste Rouge of the CNRS and the winner of an Alexander von Humboldt Senior Scientist Award. He has organized or participated in a broad spectrum of conferences in physics and chemistry, is a co-editor of one of the most important volumes in electron scattering from molecular targets and will serve on the 1998 APS Davison-Germer Prize Selection Committee.

STATEMENT: The few-body problem continues to provide an intellectual challenge in numerous areas of physics and chemistry. Many of the theoretical and computational tools used to treat the bound and scattering states of few-body systems transcend the discipline of their origin and provide important linkages between theorists in disparate fields. This Topical Group serves as an important forum for the exchange of ideas between atomic, molecular, nuclear and particle physicists and theoretical chemists interested in the few-body problem and facilitates the dissemination of these ideas to the community at large via symposia, specialized conferences and the Group newsletter. I would like to see more appreciation of the importance of few-body problems in understanding how "simple" systems can often exhibit diverse and complex behavior. An important purpose of this Topical Group is expose the broader scientific community to the elegance and beauty of the few- body problem and to encourage young scientists to enter this field of research. I would work to strengthen the ties between our Topical Group and other groups interested in few-body dynamics.

SECRETARY-TREASURER

CARL CARLSON Born: 27 April 1945. Degrees: A.B. & Ph. D, Columbia, 1965 & 1968; Field: Particle and Nuclear Theory. Instructor, Columbia University, 1967-1968; Research Associate, SLAC, 1968- 1970; Research Associate, Enrico Fermi Institute, 1970-1972; Assistant, Associate, and Full Professor, College of William and Mary, 1972- present; Visiting Scientist, SLAC, 1977-

78; Visiting Scientist, Niels Bohr Institute, Copenhagen, 1978; Guest Professor, NORDITA, Copenhagen, 1980-81; Visiting Professor, State University of New York at Stony Brook, 1982-83; Guest Researcher, Department of Theoretical Physics, University of Lund, Sweden, 1985-86. HONORS AND AWARDS: Fellow of The American Physical Society; Class of 1962 Professor of Physics; A .P. Sloan Foundation Fellow (1976); Alumni Association Teaching Award (1978); Thomas Ashley Graves Award for Sustained Excellence in Teaching (1994); Elected Foreign Member of the Finnish Society of Sciences and Letters (1996).

STATEMENT: Physics continues to be a dynamic science nourished by interactions among its subfields. The Few Body Topical Group is a valuable tool for communicating new strategic ideas and techniques from diverse areas and fostering increased cooperation and collaboration. Possible ways to make it better include starting a Few Body internet discussion group, bringing out the newsletter in a timely fashion (the latest issue is now available electronically), spreading news of relevant meetings here and abroad, and liaising more strongly with the European Few Body community. And, surely like my fellow candidates, in standing for office I commit myself to carry out the ongoing duties of the office efficiently and effectively.

JOSEPH CARLSON received his Ph.D. in physics at the University of Illinois with V. Pandharipande in 1983, and then worked with M. Kalos at the Courant Institute at NYU. He became a J. Robert Oppenheimer Fellow in the Theoretical Division at Los Alamos in 1986, where he is currently a scientist in the intermediate energy physics group. He is currently co-organizing a program on numerical methods for strongly- interacting quantum systems at the Institute for Nuclear Theory in Seattle. RESEARCH INTERESTS: Path integral techniques in quantum few- and many-body problems; interactions and dynamics in light nuclei; scattering theory and applications.

STATEMENT: Important progress in the physics of few-body systems has occurred in recent years, and the Topical Group is an important avenue for disseminating that information. Through its symposia, collaborative arrangements with APS divisions and other organizations, as well as non-traditional means such as the world wide web, it is vital that we inform the physics community of our successes and encourage the cross-disciplinary research that is at the heart of this organization.

EXECUTIVE COMMITTEE

STEPHEN R. COTANCH Professor of Physics, North Carolina State University. B. S. Indiana University, 1969; Ph. D. Florida State University, 1973; visiting student, Princeton University, 1971-72. Research Associate, Univ. of Pittsburgh, 1973-76. Assistant, Assoc., Full Professor, North Carolina State University, 1976-present. Visiting Professor, University of Melbourne, 1985. Summer fellow, Institute for Nuclear Theory, University of Washington, 1991, 92. Nordita Nordic Visiting Professor, Uppsala University, University of Helsinki and the Neils Bohr Institute, 1993. RESEARCH INTERESTS: Theoretical electromagnetic structure studies of hadrons and systems of hadrons encompassing mesons, baryons, glueballs, nuclei and hypernuclei.

STATEMENT: The Topical Group plays an important role in disseminating few-body research information to a diverse community of physicists, chemists and mathematicians. In addition to conducting topical meetings, organizing APS symposia, publishing a newsletter (including a web home page), the Topical Group should also: 1) foster stronger connections between the scientific sub-disciplines by promoting regional, perhaps even national through available televideo studios, mini- workshops and/or seminars emphasizing common few-body tools; 2) strengthen our international relations and conference communications with our few-body counterparts, especially in Europe and the Pacific Basin; 3) strive to increase membership and fellow representation; 4) create a dissertation award which will further the Topical Group's visibility; 5) articulate the significance of few-body investigations to the broader scientific public. If elected I will advocate these objectives.

PETER J. MOHR has been a Physicist at the National Institute of Standards and Technology (NIST) since 1987. Received the Ph.D. from the University of California, Berkeley in 1973, and subsequently worked at Lawrence Berkeley Laboratory. Was a Gibbs Instructor, Assistant, and Associate Professor at Yale University. Served as a Program Director in Atomic Physics and Theoretical Physics at the National Science Foundation before moving to NIST. Coordinator of the workshop on "Relativistic, Quantum Electrodynamics, and Weak Interaction Effects in Atoms," held in Jan-June 1988 at the Institute for Theoretical Physics (University of California, Santa Barbara). Chairman and member of the Advisory Committee of the Institute for Theoretical Atomic and Molecular Physics (Harvard University) 1991-4. Recently received the Alexander Von Humboldt Senior U.S. Scientist Award. Currently member of the CODATA Task Group on Fundamental Constants, and working on the 1997 Least-Squares Adjustment of the Fundamental Constants (with Barry N. Taylor and E. Richard Cohen). Fellow of the APS.

STATEMENT: As is widely recognized, the topics of few-body systems and multiparticle dynamics cross traditional boundaries between subfields of physics and chemistry, and provide a common denominator for otherwise diverse subjects such as quarks in a nucleon, the structure of simple molecules, and few-body problems in astrophysics. Few-body systems provide ideal objects for testing new theoretical methods and experimentally checking well-defined predictions. It is important to communicate to as many physicists as possible, especially younger scientists, the wealth of interesting problems and advances that are being made in this area. The FBSTG can contribute to this goal by supporting or organizing symposia, workshops, and conferences that bring together people working in the forefront of the field, and by disseminating information about the field through both traditional media and the Web.

HENDRIK JAN MONKHORST is currently Professor of Physics and Chemistry at the University of Florida. He received his PhD from the University of Groningen, the Netherlands. He is a Member of the Quantum Theory Project (QTP), an Institute for Theory and Computations in Molecular and Materials Sciences. He has been a Member of the APS since 1969, and an APS Fellow since 1991 in the DAMOP. He has never held an elected office in the APS. His research interests cover the areas of high-precision atomic and molecular physics; computational solid-state physics, with current emphasis on polymers; and plasma fusion physics. He has made major contributions to the theory and applications of the coupled-cluster method, featuring prominently in a co-authored book; molecular physics of the neutrino mass determination and muon catalyzed fusion; Brillouin zone integration and density-of-states

behavior in band structure calculations; formulation of rules in predicting intrinsic high conductivity, possibly superconductivity of polymers; and the formulation of a novel fusion reactor concept, based on Field Reversed Configuration plasmas and fueled by hydrogen and boron-11 (with Norman Rostoker, UC at Irvine). He has been invited to many Workshops, Conferences, Seminars to present his work.

STATEMENT: My work in these very different areas has taught me that many pivotal or crucial physics problems require precise, atomic or small-molecular calculations. Being versed in these few-body problems helps also to think about solutions in sharply analytical ways, and see connections and similarities among nuclear, atomic and molecular systems. The special power and universality of the Coupled Cluster method, applicable and successfully applied over a wide range of systems, is a case in point. As such, this Topical Group can help to spread this awareness, and hence can encourage collaboration of, or cross fertilization of ideas among its members.

SCOTT W. WISSINK, Department of Physics, Indiana University. Ph.D. in experimental nuclear physics, Stanford University, 1986. Research Associate, Indiana University, 1983-1987; Assistant Professor, Indiana University, 1987-1992; Associate Professor, Indiana University, 1992- present. Member: AAAS, APS (DNP). Program Committee for the DNP, 1996-present. AWARDS: Konopinski Prize for Excellence in Teaching, 1991. RESEARCH INTERESTS: nucleon-nucleon interactions; fundamental symmetry investigations via polarization phenomena; intermediate energy nuclear reactions and scattering processes, and effects of the nuclear medium on the free interaction; few- body studies using radiative capture reactions; polarized beam and target techniques.

STATEMENT: There is still far too little interaction among the various subfields of physics, despite our many obvious areas of overlap. It is important that we begin to recognize and even exploit this overlap, not only in the mathematical tools we employ, but in the ways we address many experimental concerns as well. I believe the arena of few-body systems is one where many subfields of physics converge, and where the benefits of increased interaction between these groups would be most immediate. I would work to increase the visibility and the membership of our group, through sponsorship of excellent symposia at APS meetings and at the increasing number of conferences and workshops that address few-body issues.