Nominations for President Elect

Nomination for James G. Glimm

Richard V. Kadison, Dusa McDuff, and I. M. Singer

Richard V. Kadison

As attested to by his recent (2002) National Medal of Science, and a host of other honors, James Glimm is one of this country's leading mathematical scientists. The citation for Jim's Medal of Science states:

"To James G. Glimm, Distinguished Leading Professor of Applied Mathematics and Statistics, State University of New York at Stony Brook and Brookhaven National Laboratory. For his original approaches and creative contributions to an array of disciplines in mathematical analysis and mathematical physics, which are fundamental to the theory of operator algebras, shock-wave theory, advanced quantum field theory, quantum statistical mechanics, applied mathematics, and scientific computation."

I join my two colleagues in nominating James G. Glimm for the presidency of the American Mathematical Society for his extraordinary contributions to an array of disciplines in mathematical analysis and mathematical physics and for his impressive leadership qualities and experience. His work has been fundamental to the theory of operator algebras, has revolutionized shock-wave theory, and has advanced quantum field theory and quantum statistical mechanics to levels that were previously unimagined.

Jim has made outstanding contributions to the theory of operator algebras, mathematical physics, with special emphasis on quantum field theory and quantum statistical mechanics, shock-wave theory (hyperbolic conservation laws), applied mathematics and scientific computation. In the theory of operator algebras, Glimm's earliest work, his accomplishments are seminal. The penetrating analysis of the most fundamental class of operator algebras, now called "Glimm algebras" in his honor, that he carried out, remains the cornerstone of one of the deepest and most vibrant aspects of the theory. He proved one of the first and most basic results in non-commutative approximation theory, his non-commutative "Stone-Weierstrass Approximation Theorem." He proved the Mackey conjecture on the equivalence of "smooth dual" and "type I structure," among several other important results.

Throughout his long-term collaboration with Arthur Jaffe in the subject of quantum field theory they were leaders in the subject. They helped and guided their fellow researchers as well, training many of the best workers in the area. In shock-wave theory, Glimm solved the most important and previously unapproachable problems by completely original methods that continue to resonate in the research being done in the subject decades later.

In years past, Glimm has played a leadership role in both the Society for Industrial and Applied Mathematics (SIAM) and the International Association of Mathematical Physics (IAMP). It is hard for me to imagine a more suitable and capable candidate for the AMS presidency.

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Dusa McDuff

I am happy to write in support of Jim Glimm's nomination for President of the AMS. For many years now, Glimm has been the chair of the Department of Applied Mathematics and Statistics at Stony Brook. He reinvigorated its existing groups in fluid dynamics and statistics, unifying them around the core theme of computation, and started new groups in computational geometry and, more recently, computational biology. As a result the Department plays a greatly enhanced role both in the Engineering College at Stony Brook and nationally. In the past few years Glimm has also been a key participant in the establishing of a Center for Data Intensive Computing at Brookhaven National

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Lab, providing essential scientific direction for this new and successful unit.

Glimm's outstanding leadership abilities are shown in his talent for spotting mathematical topics that are ripe for development and then for assembling interdisciplinary teams of researchers to focus on specific problems in the area, with participants ranging from the most theoretical mathematicians to the end users in engineering. He has extensive experience in interfacing with the wider community of mathematical scientists.

His talent for strategic thinking and experience in building bridges between mathematics and its applications should prove very important assets in helping the AMS find its way forward.

I. M. Singer

I am pleased to join Dusa McDuff and Richard V. Kadison in nominating James Glimm for President of the American Mathematical Society.

Even among distinguished mathematicians, Glimm stands out because of his original, seminal work in several distinctly different branches of mathematics.

In his thesis he studied certain limits of matrix algebras, and later proved an important approximation theorem for algebras of operators on a Hilbert space. His results and insights are central features of every textbook on operator algebras.

Arthur Jaffe and Jim Glimm founded the subject of constructive quantum field theory. They demonstrated the existence of scalar quantum field theories in two and three dimensions above and beyond free field theories. The concepts and techniques they invented are now standard tools in this branch of mathematical physics.

The study of hyperbolic differential equations is important because so many natural phenomena are governed by such equations. Using his intuition from quantum field theory, Glimm proved a remarkable conservation law, by methods that are very fruitful in many other applied areas.

Glimm is a new kind of American mathematician. Focused on applied mathematics and keenly interested in practical solutions, he is not averse to inventing and using powerful conceptual ideas when they are relevant. For him there are no barriers between pure and applied mathematics.

Mathematics aside, Jim has a rare gift that I believe would make him a very effective AMS president. He has the ability to isolate a problem (be it in administration, science policy, personality conflict, etc.), focus on the means available to solve the problem, and then act decisively.

I enthusiastically support the nomination of James Glimm for the presidency of the AMS.

I. M. Singer is a professor of mathematics at the Massachusetts Institute of Technology.

Nomination for Ronald J. Stern

Rob Kirby and Don Saari

Rob Kirby and Don Saari

It is a true delight to nominate Ronald Stern to be President of the AMS. Ron has the vision, background, experience, and other traits needed to be an outstanding President of our Society. He will be an excellent spokesperson in representing us, and he will provide leadership.

This article has two parts: Rob Kirby describes Ron's mathematical accomplishments and Don Saari discusses his service to the mathematical sciences community.

Rob Kirby

I've been a fan of Ron Stern's math since the days of his Ph.D. at UCLA in 1973. His work is characterized by wonderfully complicated and deep topological constructions and a broad knowledge of manifold topology and geometry.

Ron's first major result, joint with David Galewski, was a triangulation theorem for topological manifolds. Recall that an n-manifold has a piecewise linear (PL) structure (or equivalently a combinatorial triangulation) if it is covered by charts that overlap by piecewise linear homeomorphisms (or equivalently, it is homeomorphic to a simplicial complex with the property that the star of each vertex is isomorphic to a subdivision of the n-simplex).

PL structures were sorted out by Kirby and Siebenmann in 1968-69, but it was possible that non-PL manifolds had non-combinatorial triangulations. These were shown to exist when Edwards proved the Double Suspension Theorem, that, for example, a 3-dimensional manifold H with the homology of S^3, is homeomorphic to S^5 after being suspended twice (the simplices suspend to simplices but the resulting triangulation of S^5 is not combinatorial).

Galewski and Stern now showed in a beautiful *Annals* paper [gs] that all manifolds of dimension ≥ 5 have non-combinatorial triangulations iff there exists an H (as above) with Rohlin invariant one and the property that the connected sum $H\#H$ bounds an acyclic 4-manifold. Whether there is such an H has still not been settled. In dimension 4, non-PL manifolds are also not triangulable if Perelman's proof of the Poincaré Conjecture is verified.

In another lovely *Annals* paper [fs1], Ron and his now long time collaborator, Ron Fintushel, gave the first example of an exotic involution on the 4-sphere, in the sense that the quotient by the involution is not even s-cobordant to real projective 4-space, RP^4.

Beginning in 1982, Simon Donaldson and gauge theory revolutionized the subject of 4-manifolds, and Fintushel and Stern became leading players in the development of this subject. They wrote many substantial papers (e.g.

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[fs1a], [fs1b]) where they introduced topological operations that simplified the computation of these gauge theoretic invariants, culminating in the "Blow up formula" for the Donaldson invariants [fs3] which introduced an elliptic curve that was a precursor to the developments of the Seiberg-Witten equations.

However their masterpiece [fs4] involves the introduction of the Alexander polynomial of a knot into the subject of the Seiberg-Witten invariants of a 4-manifold. The Seiberg-Witten invariants of a 4-manifold X can be expressed as a finite Laurent polynomial SW_X in the basic classes in $H^2(X : Z)$.

For most elliptic surfaces, e.g. $K3$, one can remove the neighborhood of a non-singular fiber, $T^2 \times B^2$, whose boundary is the 3-torus, and glue back in the complement of a knot K in S^3 crossed with a circle (in a sense, the disk B^2 is replaced by the Seifert surface of the knot K). Fintushel and Stern exploit this surgery plus a rough relationship between gluing theorems in gauge theory and skein theory in knot theory, to prove that the new manifold X_K has Seiberg-Witten Laurent polynomial equal to the old one multiplied by the Alexander polynomial of the knot K.

This remarkable result shows that the smooth structures on, for example, $K3$, are as rich as the Alexander polynomials of knots.

Stern continues active to this day, most recently discovering (along with others) the smallest closed exotic smooth 4-manifold. His work, with his collaborators, is among the most beautiful in the field of manifold theory.

Don Saari

Before writing this part of our nomination, I thought about what we want and need from a president of the AMS. Then I thought about why I believe Ron will do a superb job.

A main responsibility of our president is to be our spokesperson. It is important to have a president who can comfortably and effectively represent us at congressional committees, with funding organizations and corporations, with other professional societies, and with the general public. But as we know from our personal experiences of trying to explain what it is that we do to our dean, or colleagues from another department, this is not easy. For success, we need someone who has the experience and special ability to work with these other groups; we need someone who can promote and describe mathematics to non-mathematicians.

Ron is such a person; for years he has been promoting mathematics on statewide panels, as the chair of his department, and currently as a highly successful dean. A way to illustrate his abilities is to point out the obvious: mathematics does not have as many endowed academic chairs as we should. The reason is clear; it is very difficult to communicate the excitement and importance of mathematics to non-mathematicians. But Ron can: a measure of his success is that he is in the process of bringing in several chairs for the UCI math department. Another indication of his unique ability to communicate is the long list of community boards on which he serves—this ranges from the Red Cross to housing authorities, to statewide efforts in promoting science. By electing Ron, we can enlist his special talents to work and influence non-mathematicians for the benefit of the AMS.

What we need from our president is leadership. In particular, we want a president with leadership skills, the willingness to listen, the talent to work with people and varied groups, the ability to appreciate different sides and achieve compromise—and someone who understands the broad and varied needs within our mathematical community. This describes Ron: he has demonstrated his leadership skills within his university and the mathematical community. We see this with his service on the MSRI Board of Trustees, where, as a member of the Steering Committee and as Secretary, he played a central role in advancing MSRI to its current level. We see this with his service to the Joint Policy Board for Mathematics and the AMS on numerous committees. Ron's professional taste and understanding have been recognized and used by many, such as the Sloan Foundation in selecting prize winners, or by the NSF in selecting new young investigators, or panels on the mathematical research institutes, or in exploring intellectual opportunities in the mathematical sciences, or in NSF site visits. Probably because of Ron's deep insights about how organizations can and should improve, Ron frequently serves on review committees for departments across the U.S. and even several in Turkey. Ron understands the needs and problems of the mathematical community.

Research is the backbone of the AMS: combining Rob's above description of Ron's valued research contributions with Ron's ability to communicate, it is understandable why Ron has been invited to be the principal speaker at so many different research conferences. But of particular relevance for our selection of Ron as president is what he can do for us; here information comes from his many contributions designed to promote the research of others. Research journals, of course, are important, and while Ron has served on several boards, what is more indicative of what we can expect from him is his willingness to invest time and energy. For instance, since its inception, Ron has been one of the most active editors of *Geometry & Topology*, and for several years he has been on the G&T executive committee. Since 1995, while serving as President and Chair of the Board of Governors for the *Pacific Math Journal*, Ron has led the journal in innovative directions. Beyond journals, Ron has played an absolutely crucial role in the formation of Mathematical Sciences Publishers, a new exciting non-profit company dedicated to high quality, low cost math publishing. This is the kind of venture that will help all of us AMS members.

Increasingly, we are discovering that it is important for AMS members to take an active role in how mathematics

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is taught in our K-12 system. But rather than just talking about it, Ron has assumed responsibility by serving on a University of California system-wide advisory council on K–12 math education and by being the PI on a large NSF science partnership grant that promotes collaborative interaction between university and K–12 faculty and students in urban areas. In another direction, Ron also is the PI for a program to encourage the brightest of the next generation. When doing my homework for this nomination, I interviewed people who know about these programs. The typical response was how Ron is "an extraordinary academic leader who epitomizes the academic missions of research, training, and service." We agree with this high praise.

Without question, Ron has the interest, knowledge, talents, leadership abilities, experience, and vision to be a successful president of the AMS. We can have these talents work for our advantage by electing Ron as President of the AMS.

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