Mathematics People

CMI Fellows Announced

The Clay Mathematics Institute (CMI) has announced two new Clay Research Fellows for 2013, both for five-year terms.

SEMYON DYATLOV will receive his Ph.D. in 2013 from the University of California Berkeley. He applies the methods of microlocal analysis and dynamical systems to problems in scattering theory, quantum chaos, and mathematical general relativity. One of his research interests is scattering resonances, which are complex numbers generalizing the concept of bound states to open systems. Resonances appear in particular when studying long-time behavior of linear waves on noncompact manifolds or decay of classical correlations for chaotic flows. In his thesis Dyatlov developed a new microlocal framework to describe asymptotics of resonances and phase space concentration of associated resonant states under dynamical assumptions motivated by the wave equations on rotating black holes.

AARON PIXTON will receive his Ph.D. in 2013 from Princeton University. His research is in enumerative algebraic geometry. The topics he has worked on recently include the tautological ring of the moduli space of curves, moduli spaces of sheaves on 3-folds, and Gromov-Witten theory.

The Clay Research Fellowship provides a young mathematician employment, under ideal conditions, for a period of two to five years. A fellow may work at the location that best suits his or her research; support for travel and research expenses, as well as provisions for collaboration, are available in addition to a generous salary.

—From a CMI announcement

Miná Receives CMS Teaching Award

JÁN MINÁ of the University of Western Ontario has been named the recipient of the Excellence in Teaching Award of the Canadian Mathematical Society (CMS). The award recognizes sustained and distinguished contributions in mathematics teaching at the undergraduate level at a Canadian postsecondary education institution.

—From a CMS announcement

Manfred Breuer (1929–2011)

Manfred Breuer, an influential mathematician and inspiring teacher, died on January 31, 2011, in Marburg, Germany, where he had been a full professor of mathematics from 1971 till 1996. Born in 1929, he attended a German high school that was located in an area under French occupation after World War II and that had to adopt the French schooling system. Out of this experience blossomed his lifelong active interest in French language, science, and culture. Breuer studied mathematics in Mainz and later in Bonn, where he got his Ph.D. in 1957, supervised by Wolfgang Krull. His thesis (1958) on Jacobian differential systems contains developments in the direction of modern symplectic geometry and Poincaré manifolds. He was Krull's assistant between 1957 and 1959, when he became fascinated with von Neumann algebras (vNAs in what follows) through Dixmier's book (1957). Breuer was then invited to Berkeley twice, in 1959–1961 and in 1963–1965. There he became acquainted with Fredholm theory in collaboration with Heinz-Otto Cordes; his Habilitationsschrift (1965) arose from these new perspectives. From 1966 to 1971, the most productive period of his career, he was a full professor at the University of Kansas in Lawrence. There he wrote his most influential work, on the Fredholm theory of semifinite vNAs (1968, 1969). In 1969 Atiyah invited him to Oxford, where he also met Singer; both were interested in Breuer's work for different reasons, while his work took new directions under their influence, as seen in his paper on bundles with vNA fibers (1973).

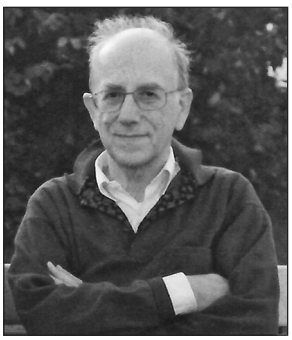

Photo by Annette Geyer.

Manfred Breuer

Breuer's collaboration with Cordes (Breuer and Cordes, 1964, 1965) emphasized homotopy theoretic arguments in Banach algebras, somehow anticipating the K-theory of operator algebras, which was fully developed only much later. In his work on Fredholm theory in semifinite vNAs, he introduces the "Breuer index", which takes values in the "index group". In modern terms, this is nothing but K_0. By choosing a faithful trace, one obtains a real-valued index. In Atiyah's influential L_2-index theorem (Atiyah, 1976), a faithful trace arises naturally from the underlying geometry, while in Breuer's more general approach no trace is preferred over any other. There are many developments arising from Atiyah's result, such as L_2-Reidemeister-Franz

torsion (Carey and Mathai, 1992) or L_2-analytic torsion (Lott, 1992; Mathai, 1992), which can be seen in hindsight to have been influenced by Breuer's work.

In parallel with Breuer's investigations but completely independently, the theory of operator ideals in semifinite vNAs was developed. Both lines of research coalesced in the late 1990s in the study of semifinite noncommutative geometry; this, in turn, led to renewed interest in Breuer's work. The impetus for extending Connes's framework in the context of semifinite vNAs was only partly due to the influence of Atiyah's L_2-index theorem, since in Connes and Cuntz (1988), it had been demonstrated that the study of cyclic cohomology leads naturally to semifinite Fredholm modules. The systematic study of semifinite noncommutative geometry was begun only in 1998 in Carey and Phillips (1998) and in connection with foliation theory (à la Connes) in Benameur and Fack (2006). The motivation for Carey and Phillips (1998) was provided by Phillips's general theory of the analytic spectral flow (Phillips, 1997), which depends on the Breuer index. Breuer's approach was indeed surprisingly prescient because, with only minor modifications, it can be adapted to the situation of the local index formula in semifinite noncommutative geometry even though a complete account had to wait until 2006 (Carey, Phillips, Rennie, and Sukochev, 2006).

In his Marburg period Breuer's research interests gradually reduced to a few questions. His later years were focused on the proof of one of Kaplansky's conjectures, which says that AW^*-factors are in fact W^*-factors. Breuer's attempts at employing homotopy theoretical arguments to prove the existence of a trace in AW^*-factors, unfortunately, did not succeed. But his interest in new developments in mathematics did not fade away; they were studied in lectures and seminars well beyond the date of his retirement. With similar energy he tried to perfect his astonishing knowledge of cultural history, with special emphasis on its French sector.

Those who met Manfred Breuer in person will remember him as a penetrating and farsighted researcher, as a helpful and inspiring teacher, and as a gracious and self-effacing human being.

A pdf file of this obituary with a complete bibliography can be found at `http://www.mathematik.hu-berlin.de/~bruening/ObituaryManfredBreuer.pdf`.

—Jochen Brüning
Humboldt-Universität
`bruening@mathematik.hu-berlin.de`

—Alan Carey
Australian National University
`Alan.Carey@anu.edu.au`

—Matthias Lesch
Universität Bonn
`lesch@math.uni-bonn.de`

Mathematics Opportunities

Math for America Fellowships

Math for America (MfA) is a nonprofit organization with a mission to improve mathematics education in U.S. public secondary schools by recruiting, training, and retaining outstanding mathematics teachers and leaders. MfA offers fellowships for new and experienced teachers and school leaders. The MfA Master Teacher Fellowship is a four-year program that rewards outstanding experienced public secondary school mathematics and science teachers. Master Teacher Fellowships are available in Berkeley, Boston, New York City, and Washington, DC; the application deadline for these fellowships is **May 6, 2013**.

The Math for America Early Career Fellowship is awarded to public secondary school mathematics teachers early in their careers. MfA Early Career Fellows exhibit outstanding potential, a dedication to professional development, and an interest in collaboration with the Math for America community. The program provides professional support and growth opportunities for new teachers. The MfA Early Career Fellowship requires a commitment of four years. Applications are being accepted for the Early Career Fellowship in New York City. The deadline is **May 6, 2013**. For more information and to apply, see `http://www.mathforamerica.org/web/guest/apply`.

—From an MfA announcement

NSF Postdoctoral Research Fellowships

The National Science Foundation (NSF) awards Mathematical Sciences Postdoctoral Research Fellowships (MSPRF) for appropriate research in areas of the mathematical sciences, including applications to other disciplines. Awardees are permitted to choose research environments that will have maximal impact on their future scientific development. Awards are made in the form of either Research Fellowships or Research Instructorships. The Research Fellowship option provides full-time support for any eighteen academic-year months in a three-year period, in intervals not shorter than three consecutive months. The Research Instructorship option provides either two