

CONTEMPORARY MATHEMATICS

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Advances in Differential Geometry and General Relativity

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On the Occasion of Professor John Beem's Retirement
May 10–11, 2003
University of Missouri - Columbia

S. Dostoglou
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To J. K. Beem, from his friends and colleagues

Contents

Preface	ix
The talks of the Beemfest	xi
A Beemian Sampler: 1966-2002 P. E. EHRLICH AND K. L. EASLEY	1
Geometry of Bicharacteristics P. E. PARKER	31
Making the Right Connection? L. DEL RIEGO	41
Cosmic Censorship Hypothesis A. KRÓLAK	51
Boundaries of Spacetimes: An Outline S. G. HARRIS	65
Cosmological Spacetimes with $\Lambda > 0$ G. J. GALLOWAY	87
General Relativity and Signature Change T. DRAY	103

Preface

This volume consists of expanded versions of talks given at The Beemfest: Advances in Differential Geometry and General Relativity that took place at the University of Missouri-Columbia on May 10 and 11, 2003 on the occasion of Professor John K. Beem's retirement after more than 34 years of research, teaching, and service. The meeting was sponsored by the Department of Mathematics of the University of Missouri-Columbia.

John Beem was born in Detroit in 1942. He went to school there and in Gardena, CA, a suburb of Los Angeles. He "always felt appreciative of the mathematics background he had going into college." College was the University of Southern California, where he also did his graduate work, getting married to his high-school classmate Eloise Yamamoto during his first year of graduate work. His dissertation was with Herbert Busemann who had noticed John enough during an undergraduate geometry class to make sure that John stayed at USC. Busemann had spent many years working on a synthetic approach to differential geometry that he called G-spaces. and several physicists had asked Busemann how his methods would apply to relativity. It was at that point that John, already interested in physics, started as his student. John's first publication was with Busemann, who, in his usual directness, made it clear to John that none of what was in their joint paper could go into his dissertation. John remembers Busemann as a dynamic teacher and advisor, holding weekly meetings with advanced graduate students and visiting geometers at his home to give them new problems and get progress updates. Already keen on teaching methods, John remembers Busemann's style: "You look at the brightest people in the class. If they follow what you are doing, you speed up the pace of the course."

John arrived at the Department of Mathematics of the University of Missouri immediately after his Ph.D. in the Fall of 1968 to join the geometers Leonard Blumenthal and Clinton Petty, an earlier Busemann student. It was the beginning of what John now describes as a "35 plus year cycle of bad job markets in the academic world," and John was thinking that he would stay for a couple of years. He stayed for 34 and a half years. In reviewing his years at MU, he singles out the "incredible development of the Department of Mathematics" to reach "levels of research that make us all proud," and the improvement in the quality of students through a series of very gradual but consistent increases in entrance requirements on the undergraduate level and by successful recruiting efforts on the graduate level.

The highlights of his research are hopefully somewhat captured by the contents of this volume. They include the publication of his dissertation results as an AMS Memoir with Peter Y. Woo in 1969, the first edition of the "Global Lorentzian Geometry" with Paul Ehrlich in 1981, its expanded second edition with Paul Ehrlich

and Kevin Easley in 1996, and his numerous publications with several collaborators, many of them contributors to this volume. Also important for him have been the very productive relations with a number of members of the Physics Department at MU.

John participated in many committees throughout campus, enjoying this “different dimension of academic life, dealing with people and with how people deal with different kinds of problems.” As the Director of Undergraduate Studies for 9 years, he gained unique insights in the quality of math majors and the problems they face. He feels that the very best students are now better than ever, and conjectures that this is partly because they actually work harder than corresponding students in the past.

The University of Missouri has recognized John Beem on several occasions for his outstanding career: He was the L.M. Defoe Chair (1981-1984) and L.M. Blumenthal Chair (1992-1997), both named professorships in Mathematics. In 1996 he received a Kemper Teaching award.

John’s interest in mathematics education goes a long way back, before such things became trendy. He joined local societies concerned with math education as soon as he arrived at Missouri, focusing more on these issues with the “ShowMe” project that started 10 years ago. Currently, he is participating in the “CM-Squared” Project, a multi-million dollar NSF grant. He hopes to see more money spent by government for the improvement of education on all levels.

How does he sum it all up? He describes himself really pleased and happy with his years at the University of Missouri and the many collaborators he has worked with during his career. And he deeply thanks the participants and all the speakers of the Beemefest.

S.D & P.E.

The talks of the Beemfest

- Paul Ehrlich *A Beemian Sampler: 1966 - 2002*
- Phil Parker *R  cherche de Geom  trie Perdu*
- Lilia del Riego *Making the Right Connection*
- Andrzej Kr  lak *Cosmic Censorship Hypothesis*
- Steve Harris *Boundaries of Spacetimes*
- Greg Galloway *Cosmological spacetimes with $\Lambda > 0$*
- Ralph Howard *Some Results and Questions about Regularity of Horizons*
- Tevian Dray *General Relativity, Signature Change, and Mathematics Education*

This volume consists of expanded versions of invited lectures given at The Beemfest: Advances in Differential Geometry and General Relativity (University of Missouri-Columbia) on the occasion of Professor John K. Beem's retirement. The articles address problems in differential geometry in general and in particular, global Lorentzian geometry, Finsler geometry, causal boundaries, Penrose's cosmic censorship hypothesis, the geometry of differential operators with variable coefficients on manifolds, and asymptotically de Sitter spacetimes satisfying Einstein's equations with positive cosmological constant.

The book is suitable for graduate students and research mathematicians interested in differential geometry.

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