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Flows and patterns: The physics of fluids, granular materials, and soft matter

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This special issue serves to celebrate and honor the prolific scientific career of Prof. Robert Behringer. Bob earned his Ph.D. in Physics from Duke University in 1975 working in the field of low-temperature physics with Horst Meyer. A picture of Bob taken during his Ph.D. studies and Horst Meyer's group circa 1972 are shown in Fig. 1. Bob was then a postdoctoral researcher with Guenter Ahlers at Bell Laboratories from 1975 to 1977. Bob began as an Assistant Professor in the Department of Physics at Wesleyan University in 1977 and moved to the Department of Physics at Duke University in 1982. He was promoted to Associate Professor in 1986, Full Professor in 1991, and became a James B. Duke Professor of Physics in 1994. He served as the Chair of the Department of Physics at Duke from 1999 to 2002 and Director of the Center for Nonlinear and Complex Systems for more than 20 years. He has mentored more than 40 graduate students and postdoctoral researchers in areas spanning low-temperature physics, Rayleigh–Bénard convection, porous media, pattern formation, chaos, and nonlinear dynamics in thin fluid films and granular media. He has pioneered measurements of contact forces using photoelastic materials in 2D granular flows and packings, and helped launch the field of 'granular physics' in the late 1990's. Bob is a Fellow of the American Physical Society and American Association for the Advancement of Science, and recently won the Jesse Beams Award from the Southeastern Section of the American Physical Society. Bob is not only a brilliant physicist, he is kind, gracious, and has achieved great success in science with humility.

Karen Daniels, Corey O'Hern, Mark Shattuck, Joshua Socolar, Antoinette Tordesillas, and Thomas Witelski organized an interdisciplinary symposium at Duke University in October 2013 to mark Bob's 65th birthday. Bob was reunited with a number of his former Ph.D. students and postdoctoral researchers, colleagues, and former advisors (Fig. 2a). More than 55 participants (Fig. 2b) enjoyed invited talks by Guenter Ahlers, Andrea Bertozzi, Bulbul Chakraborty, Hans Herrmann, Heinrich Jaeger, Jim Jenkins, Stefan Luding, Horst Meyer, Sidney Nagel, David Schaeffer, Mark Shattuck, and Antoinette Tordesillas.

This issue features fourteen articles from Bob's former undergraduates, Ph.D. students, and postdoctoral researchers, as well as several collaborators and colleagues. The articles include experimental, computational, and theoretical studies of granular media in microgravity environments [1], vibration-induced avalanches [2], three-dimensional imaging of grain orientations [3], mechanical [4,5] and vibrational [6] response of granular packings, charge interactions during stick-slip behavior [7], variations of flow fields around obstacles [8], hopper flows [9], and compacted powders [10]. In addition to granular materials, the issue also highlights novel studies of colloidal [11] and granular [12] polymers, slurries [13], and transport of sediment by desert beetles [14]. This collection of topics in soft condensed matter physics mirrors the broad impact of Bob's research over the past 40 years.

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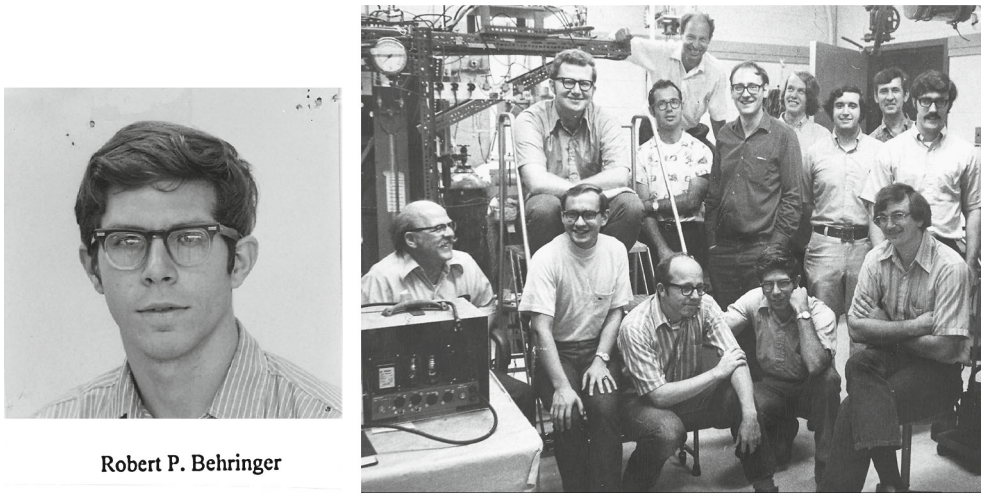

Fig. 1 *Left* photograph of Bob Behringer from the Duke University Department of Physics notice board circa 1965. *Right* Horst Meyer's low-temperature physics group in 1972. *Top row, left to right* Paul Pedroni, Barnie Wallace, Horst Meyer, Rene Wanner, David Roe, Fred Weinhaus, and technician, Greg Goellner. *Bottom row, left to right*: Edward Morgan, Robert Buzerak, Jerry Harris, Robert Behringer, and Raymond Brown

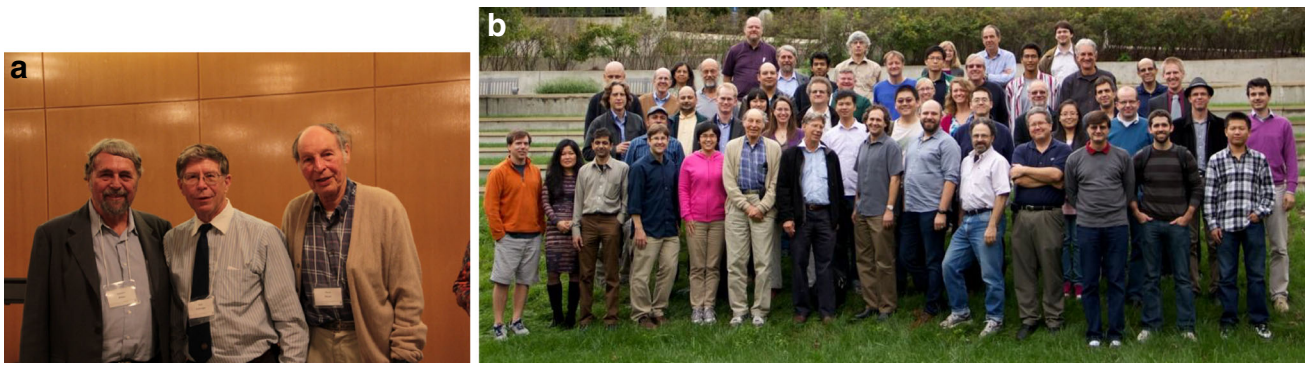

Fig. 2 **a** Bob Behringer (*center*) with his Ph.D. and postdoctoral advisors Horst Meyer (*right*) and Guenter Ahlers (*left*). **b** A group photograph of the more than 55 participants at the "Flows and Patterns: The Physics of Fluids, Granular Materials, and Soft Matter" Conference in October 2013

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