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Biocomplexity Faculty Search
c/o Professor Rob de Ruyter
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Dear Professor de Ruyter:

This letter is a confidential evaluation of Dr. Greg Huber. I have closely followed his career since he was an undergraduate at MIT, through to his current position as an assistant (soon to be associate) professor at the University of Massachusetts. In my opinion, Dr. Huber is equal to the very best of 59 Ph.D. thesis students and 62 research associates who have worked in my research group over the past 30 years at Boston University and MIT; this list includes individuals who are by now well established in leading institutions—including, e.g., Bansil, Coniglio, Daoud, Family, Herzfeld, Klein, Nakanishi, Redner, Rothschild, Selinger, Glotzer, and Barabasi.

I have known Dr. Huber since his days as an MIT undergrad, when he was doing his undergraduate thesis research with Alan Guth of MIT's Physics Department. The problem he was doing required someone to interact with whose background was in phase transitions, and Guth suggested that I be that person since I was working actively on models of critical phenomena at that time.

Dr. Huber impressed me immensely from the day I first met and talked with him. In my opinion, he is among the very best of any person I have ever seen at his level. Among the reasons for my enthusiasm is the fact that he is extraordinarily creative. He has excellent ideas, that are entirely his own. Also, he understands problems deeply so that his ideas are right on target. His grasp of percolation theory was so detailed and extensive that our research group still uses him as a resource in this field.

Despite my pleas to stay in physics, Dr. Huber decided to move into computer science, to attempt to create artificial intelligence. He went to work with Douglas Hofstadter, who was then at the University of Michigan, and who is among the world leaders in this field. After 2 years of research in Ann Arbor with Hofstadter's group. Dr. Huber decided that a physics degree is what is most appropriate for his talents and interests. He left Michigan and came to Boston to pursue a Ph.D. in our Center for Polymer Studies, in part as a result of my encouragement. This recruitment turned out to be very fortunate for us.

Here he earned straight A's and published ten papers in refereed journals. He submitted an abstract based on one of these to the International Conference on Thermodynamics and Statistical Mechanics, an IUPAP meeting that takes place only every three years. The Program committee "upgraded" his talk to the status of an invited talk, and the reactions to his talk from the international community of about 500 specialists convinced me that Dr. Huber has all the talents needed for a successful career.

During his time in Boston, Dr. Huber became an expert in computational physics, quickly mastering the IBM vector processors, and later the Connection Machines, here and elsewhere. He was the first here to figure out how to use the Connection Machine to do real science. Partly as a result of this, he was recognized by DARPA and became a "fellow in parallel processing", an honor given to only 10 students across the country, once every few years. Since then he has been pursuing a new program concerning the novel physics that occurs in weakly turbulent systems. This work has great promise for altering, in a fundamental way, the fashion in which we understand pattern formation in chemical oscillators and other reaction-diffusion systems. Some of this work was featured in a review article in Physics Today, and frames of his simulations were selected for a widely-distributed calendar of scientific graphics by the Pittsburgh Supercomputing Center.

One of Dr. Huber's most striking talents is his ability to rapidly understand new ideas, as well as to generate a good number himself. Perhaps in large part due to this quality, he was a favorite of all our many guests. and could be found talking and working at all hours with a wide range of physicists and mathematicians. A number of scientists would make special visits to our Center just to speak with Dr. Huber (Steve Strogatz and Nancy Kopell are two that come to mind). He is very easy to collaborate with.

Dr. Huber was a leader not only in original research in statistical and computational physics, but also in the area of research on how to teach difficult concepts on the interface between mathematics and the physical sciences, such as probability and stochastic processes. His approach was to take advantage of the latest computer technologies available, and to devise an integrated approach that enables students to "discover for themselves" the important results. This approach entailed a great deal of work in designing specialized software, in testing and demonstrating it, and Greg brought it off splendidly, and without a hitch. Dr. Huber played a major role in my NSF education research project, and he has been particularly effective as a role model for the students and as a catalyst for bringing together the faculty in the Boston University School of Education, with whom we interact extensively. Dr. Huber has a natural talent for teaching, and for relating difficult concepts in terms of everyday ideas. I observed first-hand his teaching in my graduate statistical mechanics course, and in our NSF project. I was so impressed by his ability to move fluidly from simple examples to the cutting edge of current research, that, on a few occasions, I had him take over my graduate class to lecture on dynamical systems and multifractal measures. These advanced graduate students later reported his visits as one of the highlights of the course. His work in the NSF education project was, in fact, the best of all the people involved in this project, which involved about 15 people. Not long ago, we hosted the best high-school students from all over Boston. We divided into three teams, and let the students vote afterward which team they found most stimulating. Dr. Huber won by a wide margin. On a personal note, his enthusiasm for science and scientific discovery were so infectious that I took every opportunity to expose my two children to Greg. I am proud to say that they are now both graduates of MIT, in large part because of their desire to follow his example.

On completing his Ph.D. in 1993, Greg received offers from the most competitive of all the postdoc openings in his field. These included Brookhaven National Labs (with Per Bak), the Niels Bohr Institute, UC Berkeley, and Los Alamos National Labs. The Berkeley offer was an endowed fellowship, and I was personally told that he was the first-choice candidate at the Niels Bohr Institute's Center for Chaos and Turbulence. In the end, he split his time between Berkeley and Copenhagen, under the auspices of the Levy Fellowship and a Danish SNF grant. After the Niels Bohr Institute, he returned to the US and accepted a postdoc position with Leo Kadanoff, Sid Nagel, and Tom Witten of the James Franck Institute, at the University of Chicago. He stayed there two years, and one of his papers from that period, on the theory of the ring-shaped stains left by many drying liquids, was published in **Nature**, and became an overnight success and an instant classic. It was widely cited and generated both domestic and international press.
Six years ago, after being offered two faculty jobs, he turned them both down to take a postdoc/lecturer position at the University of Arizona. I advised him that this was risky move in the current market. However, he saw the opportunity to learn the techniques in the promising discipline of biological physics from a master practitioner, namely Ray Goldstein. Judging from his recent and exciting publications in biological physics, and in particular his work on modeling shape changes in bacterial flagella, I believe he made the right decision.
Four years ago, Dr. Huber decided to again enter the job market and soon had a number of excellent tenure-track offers to choose from. The University of Massachusetts in Boston was looking for a young researcher to reinvigorate their physics program, and Dr. Huber was their first choice. Naturally, I encouraged him to take this offer to return to Boston, but his wife's job at WGBH also dictated this choice. In his three years at UMass, he has excelled in every aspect of academic performance. It is unfortunate that the pace of change in their Physics Department and School of Science is too slow at present to accommodate Greg's scientific ambitions, as his departure will represent a tremendous loss to their efforts.

In the past few years, Dr. Huber has developed his own style, which is characterized by his sharp theoretical insight, often combined with penetrating numerical results. This has led to a number of breakthroughs. In particular, he has focused his considerable energies on complex Ginzburg-Landau systems, vortex phases and dynamics in the presence of quenched disorder. In the case of generalized Ginzburg-Landau equations, he was the first to observe the remarkable glass-like phase of vortices. He was also the first to understand the details of the transition between the vortex "solid" and vortex "liquid" phases in this system. Another area he has explored is the role of vortices on the diffusion of passive tracers. This is a new twist on the old problem of diffusion in the presence of traps and defects, a problem which our group has long been concerned with. This same thread emerges in Dr. Huber's recent work on anomalous diffusion in flows produced by the rotation of bacterial flagella.

On another front, he attacked a difficult problem which had its roots in my group's work on rough interfaces. Dr. Huber had proposed that the geometrical structure of a certain percolation backbone, was responsible for the avalanche or jump distribution in a model of interface depinning. By applying a general theory of cluster distributions (which he developed himself), he has completely solved this problem, and resolved a thorny conflict in this field.

Personally, Dr. Huber is extremely pleasant and likable—certainly he is among the most popular of any student both with his peers and with the BU physics faculty. He is extremely modest and he works extremely hard (harder than any other student of recent memory).

In sum, Dr. Huber's considerable strengths lie equally in mathematical formalism (such as his work on river models, or his work on the elasticity theory of flagellar filaments), in physical reasoning (his work on turbulent cascades, and his fluids work at Chicago), and in computer simulations (Ginzburg-Landau equations, and interfaces). He talks and interacts with experimentalists, mathematicians, and even biologists with equal facility. He thinks clearly, explains succinctly, and has a flair for teaching—he is an outstanding lecturer. This young man is in the midst of a brilliant career: his qualifications could hardly be higher!

Best wishes,

H. Eugene Stanley
University Professor; Professor of Physics
Director, Center for Polymer Studies