

UNIVERSITY OF ILLINOIS  
AT URBANA-CHAMPAIGN

Department of Physics

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January 27, 2004

Faculty Search Committee  
c/o Prof. Rob de Ruyter van Steveninck  
Indiana University  
Biocomplexity Institute  
Swain Hall West 117  
Bloomington, IN 47405-7105

Dear Members of the Search Committee,

I am delighted to write this letter in strong support of the application of Dr. Weiqun Peng for a faculty position at your institution. Weiqun is currently a postdoctoral researcher at the University of California—San Diego, where he is working in the outstanding biophysics group of Profs. Terry Hwa and Herbie Levine. Weiqun was a graduate student of mine at the University of Illinois at Urbana-Champaign for the period 1996–2001, where I had the deep pleasure of supervising his doctoral work. As I shall describe in more detail below, the phrase “supervising his doctoral work” does not correctly capture the essence of our relationship. More accurately, Weiqun and I were close collaborators for a number of years, and they were very exciting years for me (and, I believe, for Weiqun).

Before getting down to details, I would like to begin by saying emphatically that I regard Weiqun as a truly excellent young scientist with some superb accomplishments already to his credit and an extremely bright future ahead of him. As you may well know, the doctoral program in Physics at Illinois is quite large, with some thirty to forty PhD's graduating per year. Even looking across such a large program, I would rank Weiqun as being amongst the top ten I have seen over my eighteen plus years in Urbana. His approach to science is mature and confident (but not in the least overbearing) and built on rock-solid foundations. He is highly professional, working very hard and, equally importantly, thinking very hard: a rare blend of surgical precision coupled with passion—vigour and rigour, one might say. He is also a delight to have as a colleague: thoughtful, supportive, consistent in his infectious enthusiasm (not only for his own work but for the work of others, too), team oriented, and cheerfully willing to shoulder loads. In fact, I am not sure I have ever heard him complain about anything. It is hard to imagine a more attractive package as a departmental colleague.

Perhaps I may make a few remarks about Weiqun's doctoral research in statistical physics, an area—I might add—that I believe provides an excellent training for a biophysicist, not only from the standpoint of technique but also for its scientific content. When Weiqun joined my group I had, for some years, been deeply interested in the state of matter formed, say, by vulcanizing macromolecules sufficiently that they form a solid, albeit random, state. By the time he joined us, a rather detailed picture had already emerged—via a collaboration with a number of people, including Professor Annette Zippelius (of Universität Göttingen) and a former student of mine Horacio Castillo (now a professor at Ohio University)—of the structure of this random solid state and of the phase transition to it. This picture was, however, firmly rooted at a level of approximation known as mean-field theory which, whilst often giving a qualitatively enlightening image of the true situation, typically fails to capture phenomena quantitatively. Weiqun and I set ourselves a considerable challenge: to build an exact theory of the universal properties of the vulcanization transition by developing a renormalization-group approach. Such an approach involves finding a way to implement a set of ideas that are well established as guiding principles but require creative tailoring in any particular setting. Despite the intricacies of our particular setting, which are as delicate and abstract as any I have witnessed, Weiqun managed to create the first microscopically-rooted renormalization-group theory of the vulcanization transition. Amongst the by-products was the first derivation of a long-standing conjecture of de Gennes' connecting certain of the critical properties of the vulcanization transition to the better-known percolation transition. Initially, Weiqun's results for the critical properties of the vulcanization transition were limited to the

vicinity of six spatial dimensions, a neighbourhood quite familiar to statistical physicists (and we have our reasons for inhabiting it, but this is not the place to go into them). But shortly thereafter, in collaboration with Dr. Alan McKane (University of Manchester), Weiqun and I managed to show that the connections with percolation theory held away from six dimensions, specifically down to where they actually matter, viz., in three dimensions. (Elaborating Weiqun's earlier work, Stenull and Janssen in Germany managed, independently, to demonstrate that the connection between percolation and vulcanization holds beyond the neighbourhood of six dimensions.)

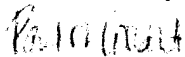
I now turn to the issue of Weiqun's conversion to biophysics. This was triggered, I believe, by his observation of the widespread intellectual excitement in and huge growth of the field, as well as by his exposure to the statistical physics of polymers. But, above all, it was triggered by his proximity to my colleague Professor Paul Selvin and Selvin's outstanding experimental biophysics research group. Thus, Weiqun found himself becoming increasingly attracted to biophysics over his last couple of years of graduate school, which led him to collaborate with Selvin's group on certain fascinating problems to do with the dynamics of the head groups of the myosin dimer, and their exploration via fluorescence resonance energy transfer spectroscopy. The experience was thrilling for Weiqun, and encouraged him to seek out and obtain for himself a postdoctoral position in which he could really transform himself into a biophysicist. I believe that the San Diego group has been the ideal setting for accomplishing this transformation.

As you will see from Weiqun's statement of research projects and proposals, his focus is on the use of "statistical physics to study complex behaviors" that arise from "the interplay of constitutive components of biological systems," and developing and using "theoretical and computational tools to explore the two intimately related aspects of biocomplexity, gene regulation—the main control system of a cell and evolution—the driving force behind the emergence of biocomplexity." There are two reasons why I have quoted Weiqun here. Not only am I impressed by his ability to articulate the general setting of his work so eloquently. But, equally significantly, I regret that I possess neither the knowledge nor the experience to say things nearly so well. In light of this, although my outsider's impression is that Weiqun's accomplishments and aims look truly thrilling, for a genuinely valuable opinion I must ask you to turn to letters from people far better informed than I am.

I should pause to explain a conspicuous omission from Weiqun application materials. Last November, my UIUC colleague (and close friend!) Professor Paul Selvin—with whom Weiqun collaborated in Urbana and also during Paul's recent sabbatical leave in San Diego—gladly agreed to write a letter of recommendation for Weiqun. However, as you may know, Paul is recuperating from a recent, serious illness, and has thus not been in a position to write on Weiqun's behalf. (Please feel free to contact me if this is an issue that you would like more about.)

I would like to conclude by reiterating the views I gave in my opening remarks: I strongly support Weiqun Peng's application for a faculty position at your institution; he is a wonderfully talented young scientist with superb accomplishments already to his credit and an extremely bright future ahead of him. Moreover, I am certain that he would be an outstanding classroom teacher, responding diligently to the needs of his students, and that he would be an excellent mentor of research students. Furthermore, he would aggressively seek out and win the funding necessary to build and maintain a research group. In addition, he would be an exceptional departmental colleague, showing wisdom far beyond his years as well as the kind of dedication and initiative that can be enormously beneficial to a university department.

Yours sincerely,



Paul M. Goldbart  
Professor of Physics