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

Dear Professor Ruyter van Stevenick,

I should like to support the application of Dr. Neer Asherie for the tenure track position of assistant professor in the Biocomplexity Institute at Indiana University.

Dr. Asherie received his Ph.D. in the field of Biological Physics at MIT in 1998, and I served as his thesis advisor. His research was a combined experimental and theoretical investigation of the phase diagram of the lens gamma crystallin proteins.

This research involved an experimental determination of the conditions of temperature and protein concentration at which the protein solutions would separate - either into two coexisting liquid phases, or into coexisting liquid and solid phases. This information is basic to an understanding of the phenomenon of cold cataract formation in the mammalian lens. It is also basic to the process of protein crystallization, since it establishes the domain within which crystal growth is thermodynamically possible. Dr. Asherie is skilled in a variety of experimental methods. These include quasielastic light scattering spectrosocopy, protein isolation and purification methods, optics and computer simulation and programming.

In addition to his experimental work, Neer developed a brilliant theoretical analysis, using Monte Carlo simulations, which showed that the location of the critical point for liquid-liquid phase separation was the consequence of a short range interaction between proteins. These theoretical findings demonstrated the limitations of the long range, mean field theories, which had previously been used, and cast light on the detailed form of the interprotein interactions actually responsible for phase separation.

He discovered, by in-vitro experiments, the physico-chemical basis for the formation of the opacity in three types of human cataracts. He showed mathematically that the interprotein interactions responsible for phase separation were not only short range, but also highly anisotropic. He also discovered that the kinetics of protein crystallization could be very strongly altered by single point mutations in their amino acid sequence. He helped determine the properties of self assembling helical ribbons constituted of chiral amphiphiles. These ribbons have the promise of serving as mesoscopic springs capable of measuring forces between assemblies of biological molecules. He has recently published, along with Dr. Aleksey Lomakin, on an important new discovery on the kinetic mechanisms for protein crystal nucleation using Monte Carlo simulations.

Dr. Asherie is a truly gifted scientist. He is strong both in experimental investigations and deep theoretical analysis. He is unusually talented in teaching and in communicating with colleagues. Indeed, he was the winner of the coveted William Buechner Teaching Prize, awarded by the physics department for the finest teaching by a graduate student. Connected with these are his unusual linguistic gifts. By my count Neer is fluent in five languages.

In addition to these valuable qualities, he also has considerable skills in administration. He is very well organized and effective in solving problems connected with the scientific, financial, and administrative supervision of our research grants. Indeed, he is Co-Principal investigator on our NASA grant entitled "Kinetic Evolution of Stable and Metastable States in Protein Solutions".

I believe Dr. Asherie has, in full measure, the high abilities needed to achieve important scientific advances at the interface between the physical sciences, biology and medicine. He is as well an outstandingly gifted and effective teacher. I am confident that he has the intelligence, energy and high ability needed to serve with distinction as a faculty member in your Biocomplexity Institute at Indiana University. I support his candidacy without reservation.

Very truly yours,

George Benedek

George Benedek
Alfred H. Caspary Professor of Physics and Biological Physics