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אוניברסיטת בר-אילן  
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Biocomplexity Faculty Search Committee  
c/o Prof. Rob de Ruyter van Steveninck  
Biocomplexity Institute  
Indiana University  
Swain Hall West 117  
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USA

Dear Sir,

It is my pleasure to write a letter of recommendation for Dr. Plamen Christov Ivanov in support of his application for an academic position in your institute.

I have known Dr. Ivanov for seven years, during which we have worked in collaboration on several scientific projects. I regard him as an extremely creative, capable and promising scientist. His outstanding contributions to statistical physics applications in biology and physiology have had a wide impact on the community and are internationally recognized.

Dr. Ivanov has written many original and review articles, which have been published in the most highly recognized journals.

Dr. Ivanov has made several significant contributions to the very active field of applying concepts and techniques originating in statistical physics and nonlinear dynamics to complex physiological systems. He developed a new approach based on wavelet analysis to study non-stationary biological time series. Dr. Ivanov applied this method to cardiac dynamics and found several surprising and useful scaling properties, which lead to better understanding of the underlying physiology. His results were published in the journal, Nature [vol. 323, p.323, 1996], and are regarded by the international community as a breakthrough in this rapidly growing field. Indeed, his findings are so fundamental that they can be used as a method for early detection of heart disease by simply measuring the heart rate for several hours.

Dr. Ivanov has developed an analytical model based on physiological input and novel stochastic feedback approach to model neuroautonomic regulation of heartbeat dynamics [Europhysics Letters, vol. 43, p.363, 1998].

Multifractality, an abstract mathematical concept, was only applied in the last few years to a limited number of physical systems. Dr. Ivanov was the first to discover multifractal features in physiological systems [Nature vol.399, p.461, 1999]. He found that healthy cardiac dynamics is multifractal while sick hearts are characterized by loss of multifractality. This work led to many consequent studies of multifractality in other physiological systems.


In collaboration with other researchers, Dr. Ivanov has found that abnormal ectopic beats in patients with congestive heart failure form surprisingly distinct patterns, which may be associated with the rate of survival of these patients. Specifically, his finding indicates that patients with a relatively smaller number of abnormal heartbeats can be at higher risk of heart attack, if these abnormal beats form a particular sequential temporal pattern in conjunction with the normal beats. A modeling approach that successfully reproduces such patterns of abnormal beats was recently published in the most prestigious physics journal, Physical Review Letters, vol.87, 0681074, 2001.

I am convinced that Dr. Ivanov's contributions to the field of application of statistical physics are very important, and lead to a better understanding of the various mechanisms governing the complex dynamics of biological systems. The methods and approaches he has developed can be applied to a broad range of complex physical and biological systems, and even to economics. In fact, Dr. Ivanov has also performed high quality work related to human gait, breathing dynamics; sleep phase transitions and financial indices. His novel techniques and findings have been found useful for developing novel diagnostic methods. Most recently Dr. Ivanov's initiated studies on transport properties in low-dimensional disordered media with implications to conductivity in DNA and proteins [Nature, vol.418, p.955, 2002].

I find the mathematical, physical and biological skills of Dr. Ivanov and his scientific intuition to be outstanding. I have heard him give lectures at several conferences where he gave invited talks and I have found his presentations to be exceptionally clear and exciting. In the last five years he has guided the research work of several Ph.D. students in Boston University and in Bar-Ilan University. I regard Dr. Ivanov to be between the top scientists of his generation.

I have no doubt that any university or research institution will be proud to have him, and I fully support his application for a faculty position.

Sincerely Yours,



Shlomo Havlin  
Professor of Physics  
Past President  
Israel Physical Society