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Biocomplexity Faculty Search Committee,
c/o Prof. Rob de Ruyter van Steveninck,
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U S A

19. December 2003

Dear Professor van Steveninck,

This letter of recommendation is written on behalf of Dr. Dmitri Toptygin, to whom I was a senior colleague and informal supervisor for over ten years when we worked together at the Lebedev Physics Institute of the Russian Academy of Sciences (Moscow, Russia). The head of the laboratory where we both worked, professor E.A. Sviridenkov, has died, and after professor Sviridenkov I am the most competent person to write about Dr. Toptygin's work at the Lebedev Physics Institute.

Dmitri Toptygin came to the Lebedev Physics Institute in 1977 as a student of the Moscow Institute of Physics and Technology to work on his M.Sc. project. He designed and built an interface linking our most sensitive intracavity laser spectrometer to a computer, invented mathematical algorithms for separating narrow absorption lines from the envelope of the laser emission spectrum, and wrote a computer program generating tables of spectral lines from the raw experimental data. Using the interface and the program, our laboratory produced the most complete tables of atmospheric absorption lines in the 602-637 nm range. Within the 602-625 nm window of transparency, where no absorption lines were known before our work, we discovered more than 900 new absorption lines. The results of this work gave Dmitri his first three publications and were included in his M.Sc. thesis.

In 1980 Dmitri Toptygin earned his M.Sc. degree, and immediately after that he was offered a permanent research position at the Lebedev Physics Institute, which was quite an exceptional accomplishment itself at that time. As a research scientist, Dmitri continued to work in the field of IntraCavity Laser Spectroscopy (ICLS). He engaged in both experimental and theoretical studies of the dynamics of broadband lasers used in ICLS. I also consider very important the results of his numerical simulations of the spectral dynamics of a multimode dye laser with nonlinear mode coupling.

Dmitri revealed himself as a bright physicist capable of explaining odd experimental phenomena. In 1986 our Ph.D. student V.F. Gamalii observed spectral condensation near strong intracavity absorption lines in a laser with periodically modulated gain. Dmitri suggested a theoretical explanation of this phenomenon, which eventually resulted in a new

quantitative technique [V.F. Gamalii, D.D. Toptygin. *Opt. Spectrosc. (USSR)* **78**: 172-174 (1995)].

Starting from 1984 Dmitri Toptygin worked in two fields: in addition to ICLS he also took part in a new project in the field of time-resolved fluorescence spectroscopy. He built and inproved a time-correlated photon counting instrument and measured nanosecond fluorescence decay in many systems, often in collaboration with researchers from other laboratories, including international collaboration with the Charles University in Prague, Czech Republic.

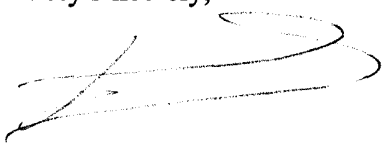
Dmitri Toptygin has been an informal thesis advisor to V.A. Sklyaruk, a Ph.D. student from the Moscow Institute of Physics and Technology, who has successfully defended his Ph.D. thesis. V.A. Sklyaruk used the instrument built by Dr. Toptygin to obtain experimental data for his thesis; furthermore, Dr. Toptygin also suggested the theoretical interpretation of these experimental data. Specifically, Dr. Toptygin made the first theoretical evaluation of the rate of Förster resonance energy transfer between dye molecules in a liquid-crystal matrix [V.A. Sklyaruk, D.D. Toptygin, S.D. Khan-Magometova. *Opt. Spectrosc. (USSR)* **62**: 753-757 (1987)].

Dmitri Toptygin was the first scientist who realized that the rate of spontaneous emission of dyes embedded in liquid crystals may vary with the orientation of the emitting dipole moment. Later he found another system where the spontaneous emission rate is orientation-dependent: a lipid bilayer. This shifted the interests of Dr. Toptygin to the area of biophysics. He started this research of fluorescence in lipid bilayers in collaboration with the Charles University in Prague, Czech Republic. In 1990 professor Ludwig Brand of the Johns Hopkins University, USA, became aware of this research and invited Dr. Toptygin to the Johns Hopkins University. This collaboration resulted in several publications, including the review article [D. Toptygin, L. Brand. *J. Fluoresc.* **5**: 39-50 (1995)].

Since 1990 Dr. Toptygin has been working in the United States in the area of biophysics, and I have moved to Germany to continue my research in the area of laser physics, therefore I am not particularly familiar with the last 13 years of Dr. Toptygin's career as a scientist, but I hope that other references will cover this period.

In closing, Dr. Toptygin is a highly motivated and enthusiastic scientist. A combination of thorough education, outstanding experimental skills and solid theoretical background enables him to carry out high level research in different areas of physics and biophysics. In my opinion, he is a perfect candidate for a Professor position in experimental science at the Indiana University.

Very sincerely,



Valery Baev