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Letter of Recommendation For

Dear Committee,

This is a letter of recommendation on behalf of Dr. Iossif POLTEROVICH who is applying for a position in your department.

I have met Iossif in the summer of 2000 when I was visiting the Weizmann Institute. He was then about to complete his dissertation about heat kernels. Even though I am not an expert in partial differential equations, I was interested, since Iossif showed me some intriguing conjectured combinatorial identities, and asked me to prove them, which I did.

To my surprise, a few months later, Iossif significantly extended my rudimentary method, and applied the ideas to a much more general context. I was very impressed how he picked up the combinatorics so fast, and was able to interface it so nicely with analysis. Even though I am not an expert in analysis, my impression is that his work is very deep and significant.

In particular, Polterovich developed a powerful new approach to the study of the heat trace asymptotics. Computation of the heat invariants is a long-standing problem with many applications to spectral geometry, scattering theory and integrable systems. His method is based on a multiple commutator expansion for resolvent kernels of elliptic operators due to Agmon and Kannai ([AK]).

Iossif also found a concise reformulation of the Agmon-Kannai result eliminating multiple commutators. He then applied this to calculation of the heat kernel coefficients for the Laplacian on a 2-dimensional manifold.

He also applied similar techniques to the 1-dimensional Schrödinger operator. Its heat kernel coefficients are known to generate the Korteweg-de Vries hierarchy. Iossif's results yield beautiful new explicit formulas for the KdV hierarchy.

Iossif then further developed his method and generalized it to arbitrary dimensions. Moreover, with the help of certain combinatorial identities he presented his results in an

invariant form, obtaining closed formulas for all heat invariants of a Riemannian manifold in terms of powers of the Laplacian and the distance function.

To sum up, Iossif is a very promising young researcher, with a very solid and impressive record, who will undoubtedly become a leader in his field. I recommend him very highly.

If you have any further questions, I will be glad to answer them. My phone numbers are (609)921-7873 (home), and (732)445-1326 (office).

Sincerely,

Doron Zeilberger, Ph.D.
Board of Governors Prof. of Math