David Kazhdan

Dr. David Kazhdan received his PhD from Moscow State University in 1969 under the supervision of Alexander Kirillov. After he left the Soviet Union, he took a position at Harvard University in 1975. He is currently a professor at the Hebrew University of Jerusalem as well as a professor emeritus at Harvard University. Kazhdan is an expert in representation theory.

Kazhdan held a MacArthur Fellowship from 1990 to 1995. He was the doctoral advisor of Vladimir Voevodsky, a recipient of the Fields Medal, one of the highest awards in mathematics. Kazhdan has been a member of United States National Academy of Sciences since 1990, of the Israel Academy of Sciences since 2006, and of the American Academy of Arts and Sciences since 2008. In 2012, he was awarded the Israel Prize, the country's highest academic honor for mathematics and computer science.

Shing-Tung Yau is an outstanding mathematician and a very impressive person. I am very glad to participate in the celebration of his 70th-birthday.

Shing-Tung has so many outstanding papers that it is impossible even to summarize their content in a small number of pages. Therefore I will only mention areas of mathematics and physics in which works of Shing-Tung are of major importance.

Differential Geometry

The first main result in this area is the solution of the Calabi conjecture, which has a number of applications in Algebraic Geometry and is now fundamental in String Theory.

The other is the solution (a joint work with R. Schoen) of the long-standing conjecture saying that the total mass in general relativity is positive. This work introduced the method of using minimal surfaces to study geometry and topology. This method is of major importance.

The works of Shing-Tung are also central in the proof of the Smith conjecture saying that for any cyclic group acting on a sphere, the set of fixed points is not a knotted curve.

Shing-Tung (a joint work with Yum-Tong Siu) proved the Frankel conjecture in complex geometry, stating that any compact positively curved Khler manifold is biholomorphic to complex projective space.

Shing-Tung formulated a number of conjectures in geometry that outline the further development of the area.

String Theory

The paper *Mirror symmetry is T-duality* (a joint work with A. Strominger and E. Zaslow) contains a proposal (or a conjecture) that defined and organized our understanding of the *Mirror symmetry*. Let X be a Calabi-Yau n-fold with a fixed Ricci-flat metric with Kähler form ω, and a choice of a nowhere vanishing normalized holomorphic n-form Ω. The SYZ-conjecture states that if X has a mirror then there is a fibration $f : X \to B$ whose general fibres are special Lagrangian n-tori. Furthermore, the mirror of X is obtained by dualizing this n-torus fibration.

The SYZ-conjecture also predicts the existence a Monge-Ampère metric on the base B of the SYX-fibration B in "the large complex structure limit". In the paper Affine manifolds, SYZ geometry and the Y vertex (a joint work with J. Loftin and E. Zaslow) Shing-Tung studied a related important question "when for an affine manifold B with some singularities, is it possible to find a Monge-Ampère metric on B?".

In this paper the authors constructed a Monge-Ampère metric in the case when the singular locus is a neighbourhood of a trivalent vertex in a graph.

There are a number of other important works of Shing-Tung in this area such as the recent paper *Gauss-Manin connection in disguise: Calabi-Yau three-folds.*

Discrete Differential Geometry

There are a number of important contributions of Shing-Tung in this area. I mention only the paper *A realization of Thurston's geometrization: discrete Ricci flow with surgery* extending the works of Thurston on surfaces to varieties of higher dimensions.

In addition to purely scientific achievements, Shing-Tung is an outstanding ad- ministator. My personal experience is restricted to the work of the Harvard Mathematical Department. Shing-Tung became chairman only after I left, but I have never heard such praises for the work of a chairman as in the case of Shing-Tung.

My best wishes for Shing-Tung and I expect to enjoy many new works of him.