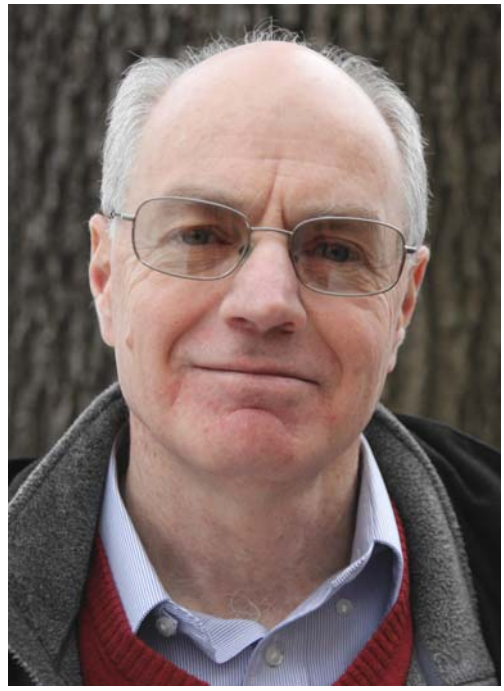
Analysis Math., **48 (2)** (2022), 283–286
DOI: 10.1007/s10476-022-0165-3

PREFACE TO THE SPECIAL ISSUE DEDICATED TO LÁSZLÓ LEMPERT

The present issue is a tribute to László Lempert on the occasion of his 70th birthday. All the articles were carefully refereed. This special issue was handled by Norman Levenberg and Róbert Szőke (as guest editor). The editors express their gratitude to all the authors who contributed to this collection.



(Photo by the author)

László Lempert

László Lempert was born in Budapest, Hungary on June 4, 1952. He was a student of the Radnóti Miklós high school in Budapest, named after the famous Hungarian poet. This school is one of the best high schools in Hungary, in particular it is known for its strength in mathematical education. As

a high school student, László participated twice in the highly prestigious International Mathematical Student Olympics, both times winning 4th place. He was an undergraduate student at Eötvös Loránd University (ELTE) between 1970 and 1975. He received the University Diploma in mathematics in 1975, the University Doctorate in 1979 and the Candidate of Sciences degree in 1984, all from ELTE. László was also a faculty member there from 1977 until 1988 when he moved to the United States and assumed his present position as professor of mathematics at Purdue University.

László is married to Márta Istók. They have two children, Mary and Daniel, and a grandchild, Charlie Jack.

László was a visiting research fellow at the Université de Paris VII (1979–80) and a visiting lecturer at Princeton University (1984–85). He was an invited speaker at the International Congress of Mathematicians in Berkeley in 1986.

László received the Grünwald Géza Prize of the Hungarian Mathematical Society in 1981, the Alexits György Prize of the Hungarian Academy of Sciences in 1985 and the Stefan Bergman Prize in 2001. He received the Joel S. Spira Faculty Teaching Award in 2004. He was elected an external member of the Hungarian Academy of Sciences in 2004 and in 2012 he was named a fellow of the American Mathematical Society. László was also a senior Clay Scholar in 2008. His position at Purdue is Distinguished Professor of Mathematics. He also served as the head of the department from 2011 to 2013. László has 15 PhD students.

Although I was never officially a student of László's, his impact on my life at the mathematical and personal level is enormous and decisive. I am convinced that his official PhD students would agree with me that his deep understanding of mathematics, his very friendly style, and his stimulating, generous and empathetic mentorship makes him a great advisor.

I was fortunate to meet László during my undergraduate years at ELTE. The very first time, I believe around 1979, was in a seminar where László talked about some results of his own concerning analytic disks attached to a totally real manifold. The next time that I can recall was during one of the regular summer schools of ELTE in 1980, in the city of Veszprém. László was giving a lecture series on several complex variables. He started from scratch and the lecture culminated in the proof of the Rosay–Wong theorem that a strictly pseudoconvex domain with non-compact automorphism group is biholomorphically equivalent to the ball. His lectures were very elegant and enlightening and made a deep impression on me. I took a deep breath and approached him. As a result we started to meet on a regular basis to talk about mathematics. László was still "too young" at the time; he did not have the formal qualifications yet to become my official diploma advisor. Nevertheless, he always had plenty of time to meet me and discuss

mathematics. These meetings often took place at his home on Szent István Boulvard, or else we started at the department and then he would invite me to his home for dinner. Thus I got to know László's family as well.

Szent István Boulvard is not far from Margaret Island, a favorite place to take a walk in the shade of the huge trees. When László's son Dany was a small child, they frequently visited this island. I remember one such occasion when I was with them during which László explained to me what worm domains were. In fact, these meetings did not end with my graduation at ELTE, they have continued ever since whenever we are on the same continent and have a chance to meet in person. This is an invaluable present in my life.

As students at ELTE we greatly benefited from the courses László taught. The title was "Adventures in function theory" and he taught this several times on different topics ranging from elliptic functions, Weyl's law, isoperimetric inequalities, and other "pearls of function theory" (as he called them). László also taught problem solving sessions at ELTE for students who would become high school teachers. His handwritten notes from these sessions are still kept as treasures and gold mines of problems.

Although László left ELTE in 1988 to move to Purdue, we were fortunate to have him back several times during his sabbatical years. Each time he brought us a present in the form of a course he taught. I especially remember harmonic analysis as the science of symmetry; mathematical methods of mechanics; and deformations of complex structures. His style of presenting mathematics is legendary; he is always very interesting and he explains clearly why things work.

László has been a leading figure in several complex variables for over 40 years but his mathematical interests are much broader, ranging among, but not limited to, complex analysis, partial differential equations and differential geometry. Here are some highlights of his research:

László introduced the notion of extremal and stationary analytic discs, proving deep connections between the Monge–Ampère equation and the Kobayashi metric on convex domains. Using these tools he gave a new proof of Fefferman's theorem on the extension of biholomorphic maps between strictly pseudoconvex domains and he also obtained the striking result that the Carathéodory and Kobayashi distances agree on convex domains.

He has proved very precise theorems on boundary regularity of biholomorphic mappings and deep results on CR manifolds. Among other such results, László showed that a compact, strictly pseudoconvex real analytic hypersurface can be embedded into the unit sphere of a Hilbert space.

Together with E. Andersén, László proved a Runge type approximation theorem for biholomorphic maps defined on starshaped domains in complex

Euclidean space that is crucial in understanding the structure of the group of automorphisms of $\mathbb{C}^n$. This paper was the starting point of a new research area in complex analysis that is now known as Andersén–Lempert theory.

In a long series of papers, László systematically studied the Cauchy–Riemann equations and Dolbeault cohomology in infinite dimensions. In particular, combining subtle, difficult and ingenious methods, he proved vanishing theorems in Banach space settings.

Together we studied certain global solutions of the complex homogeneous Monge–Ampère equation on Stein manifolds. Out of these investigations the notion of adapted complex structure (canonical complexification of a Riemannian manifold) arose. Later we showed that this structure was just one member of a canonical one parameter family of Kähler structures. In order to quantize Riemannian manifolds using these structures we introduced the notion of a smooth and analytic field of Hilbert spaces. These fields, inspired by B. Berndtsson, are very useful to study direct image problems: pushing forward a Hermitian holomorphic vector bundle along a nonproper map.

László proved that a reduced Stein space with isolated singularities can be exhausted by open sets that are biholomorphic to open sets in affine algebraic varieties. As a consequence, he obtained that if a strongly pseudoconvex, compact CR manifold bounds a strongly pseudoconvex, compact complex manifold, then it also bounds a strongly pseudoconcave, compact complex manifold.

The set of Kähler forms representing a fixed cohomology class on a given compact Kähler manifold can be equipped with a Riemannian metric, introduced and studied by Mabuchi, Semmes and Donaldson. The geodesic equation of this metric is a certain version of the complex Monge–Ampère equation. Since the work of Mabuchi in the 80's it was believed that any two points in the Mabuchi space could be joined by a smooth geodesic. László, together with L. Vivas, disproved this by showing that C^3-smooth geodesics do not always exist. Later with T. Darvas, László sharpened this by showing that in some cases not even weak geodesics with less regularity exist.

Together with B. Berndtsson he proved a sharp version of the Ohsawa–Takegoshi extension theorem. They also gave a quite simple, very elegant proof of the Suita conjecture based on Berndtsson's earlier result on the positivity of direct image bundles.

For many of his peers and younger colleaugues, László has been an inspiration and a role model in his attitude to mathematics and to life. László, I wish you a Happy Birthday and many more active years in research!

Róbert Szőke