



**PREFACE: OPERATOR THEORY, MATHEMATICAL PHYSICS  
AND THEIR APPLICATIONS  
DEDICATED TO PROFESSOR FRITZ GESZTESY ON THE  
OCCASION OF HIS 70TH BIRTHDAY**

MAXIM ZINCHENKO, SIMEON REICH, AND ALEXANDER J. ZASLAVSKI

This special issue on Operator Theory, Mathematical Physics and Their Applications is dedicated to Professor Fritz Gesztesy on the occasion of his 70th birthday.

Fritz (Friedrich) Gesztesy is an outstanding Austrian-American mathematical physicist and Professor of Mathematics at Baylor University, who has made fundamental contributions to spectral theory, functional analysis, nonrelativistic quantum mechanics (in particular, Schrödinger operators), ordinary and partial differential operators, and completely integrable systems (soliton equations). He has authored 7 books and more than 300 publications on mathematics and physics and has 17 PhD students.

After studying physics at the University of Graz, Fritz Gesztesy continued with his PhD in theoretical physics and earned a PhD in 1976. During 1977–82 he worked at the Institute for Theoretical Physics of the University of Graz and worked abroad at Bielefeld University (Alexander von Humboldt Scholarship 1980–81 and 1983–84) and at the California Institute of Technology (Max Kade Scholarship 1987–88). He was appointed a Professor at the University of Missouri in 1988 and a Houchins Distinguished Professor in 2002. In 2016 he joined the faculty of Baylor University as Storm Professor of Mathematics. In 1983 Fritz Gesztesy received the Theodor Korner Award in Natural Sciences and in 1987 the Ludwig Boltzmann Prize of the Austrian Physical Society. In 2002 he was elected to the Royal Norwegian Society of Sciences and Letters. In 2013 he became a Fellow of the American Mathematical Society. In 2022 he received an honorary doctorate from the Graz University of Technology.

Fritz's research interests developed from spectral and scattering theory for Schrödinger and Dirac-type operators in his early years, to integrable systems and their connections with spectral theory (via trace formulas), and later returned to various aspects of spectral theory for ordinary and partial differential operators of relevance to mathematical physics.

In this special issue we present papers authored by a select group of experts in the areas of Operator Theory, Mathematical Physics and their applications. The special issue contains twelve papers contributed by researchers in Operator Theory and Mathematical Physics from Australia, Austria, Chile, the Czech Republic, Germany, Mexico, Norway, United Kingdom, and the USA

These papers cover a wide spectrum of important problems and topics of current research interest, including resonances and stability of absolutely continuous

backward shift on  $H^1$ , weak operator continuity for evolutionary equations, a conjectured property of the Witten index and an application to Levinson's theorem, a direct proof of the operator Hardy–Littlewood maximal inequality, weak convergence of spectral shift functions, long-time asymptotics for the Korteweg–de Vries equation with integrable reflectionless initial data, geometry effects in quantum dot families, a div-curl inequality for orthonormal functions and perspectives in inverse spectral theory.

We hope that this special issue is of importance for many mathematicians interested in recent developments in Operator Theory, Mathematical Physics, and Analysis, as well as in their diverse applications.

Happy Birthday, Fritz!

MAXIM ZINCHENKO

Department of Mathematics and Statistics, University of New Mexico, Albuquerque, NM 87131, USA

SIMEON REICH

Department of Mathematics, The Technion – Israel Institute of Technology, 32000 Haifa, Israel

ALEXANDER J. ZASLAVSKI

Department of Mathematics, The Technion – Israel Institute of Technology, 32000 Haifa, Israel