

## PREFACE

XLVI Conference of Theoretical Physics  
*Matter To The Deepest:*  
*Recent Developments In Physics of Fundamental Interactions*

Our conference has been organized since 1975 by the Department of Theoretical Physics of the University of Silesia in Katowice (Poland). Formerly, they had the form of schools yet since 2003 their character has become that of a conference or even workshop. Previous conferences took place in Szczyrk, Żywiec, Ustroń, places in the Beskidy Mountains in the South of Poland; in Podlesice, some 80 km north of Katowice, a picturesque village situated in the Eagle's Nests Landscape Park and the Jurassic Cycling Eagle's Trail, in Chorzów and Katowice. In 2021, due to the Covid-19 pandemic, we organized the conference online. Last time, in 2023, the conference took place in Ustroń again.

This time, the conference has been organized in Katowice (Spinplace) by the Institute of Physics, University of Silesia, in cooperation with the Physics of Fundamental Interactions Section of the Polish Physical Society.

We were glad to see specialists in both theoretical and experimental particle physics presenting the most recent developments in their fields. Altogether, we had 62 on-site participants, and 49 talks were presented, some delivered by Ph.D. students and postdocs.

The link to the web page of the conference, including slides of all talks, is  
<https://indico.if.us.edu.pl/event/21>

The talks covered a broad spectrum of physical problems connected with:

- Precision tests of the Standard Model,
- Low energy physics,
- Methods in multi-loop calculations,
- Extensions of the Standard Model,
- Neutrinos, astrophysics, and cosmology.

Such a broad spectrum of subjects is one of the characteristic features of this conference, where many different views on frontiers in Particle Physics and Astrophysics have been presented and discussed.

We also enjoyed an outreach talk by Prof. Sven-Olaf Moch on *The future of particle physics*.

Given the variety of topics presented at the conference, we thank the speakers for their efforts in preparing engaging talks for all audiences. We are especially grateful to those who took the time to prepare their contributions for publication in these proceedings. We also thank the chairpersons of the sessions: Zoltan Trocsanyi, Mikołaj Misiak, Andrzej Siódmok, Alexander Korchin, German Rodrigo, Wiesław Płaczek, Sacha Davidson, Sebastian Sapeta, Gabor Somogyi, and Thomas Gajdosik.

We hope that participants spent a fruitful time in Katowice, not only engaging with the scientific programme and discussions, but also enjoying the special session marking the 50<sup>th</sup> anniversary of the conference, as well as the leisure activities, including a visit to the Silesian Museum and a guided tour of Katowice.

We highly appreciate the efficient collaboration with the team of *Acta Physica Polonica B* in producing this volume of proceedings. Our gratitude also goes to our colleagues from the local organizing team.

*Bartosz Dziewit*  
*Janusz Gluza*  
*Biswajit Karmakar*  
Editors of the Proceedings