

Preface

A few days before leaving Prague, after 15 months spent at the German part of Charles-Ferdinand University, Albert Einstein submitted a paper titled *Relativity and Gravitation. Reply to a Comment by M. Abraham*. It was received by *Annalen der Physik* on July 4, 1912. Stimulated by Abraham's criticism, Einstein summarized the contemporary state of his relativistic theory of gravitation and, remarkably, anticipated what a future theory of gravity should look like.

The organizers of the conference "Relativity and Gravitation: 100 Years After Einstein in Prague," held in Prague on June 25–29, 2012, were inspired by the title, date, and significance of this last of Einstein's Prague papers. The aim of the conference was to review the present status of the general theory of relativity (both classical and quantum) and its applications in cosmology and astrophysics from a broad perspective. The articles based on the plenary lectures are published in a separate volume *General Relativity, Cosmology and Astrophysics: Perspectives 100 Years After Einstein's stay in Prague* (Springer 2014). The titles and the abstracts of these review talks are included in these *Proceedings* in the first chapter. The second aim of the conference was to present the newest results in each of the fields mentioned above. These were presented in afternoon sessions consisting of contributed talks and posters. This *Proceedings Volume* contains such contributions. For a better overview, they are divided into three parts:

- Classical General Relativity
- Quantum Fields and Quantum Gravity
- Cosmology and Relativistic Astrophysics

Within each of these parts, first articles based on the contributed talks are presented in alphabetical order, then follow articles based on the poster presentations.

Over 200 relativists and astrophysicists from 31 countries appeared in Prague. The abstracts of their talks and posters, and video recordings of all invited lectures are available on the conference website <http://www.ael100prg.mff.cuni.cz>.

The conference was organized under the auspices of the Rector of Charles University, the oldest university north of the Alps (founded in 1348). The lectures took place in the Blue Lecture Hall in the historical complex of the University in the heart of Prague's Old Town.

The Scientific Organizing Committee included Marek Abramowicz, Lars Andersson, Abhay Ashtekar, Julian Barbour, Jiří Bičák, Roger Blandford, Bernd Brügmann, Piotr Chruściel, Thibault Damour, Karsten Danzmann, Fernando de Felice, George Ellis, John Friedman, Helmut Friedrich, Valeri Frolov, Gary Gibbons, Gary Horowitz, Joseph Katz, Karel Kuchař, Jerzy Lewandowski, Gernot Neugebauer, Hermann Nicolai, Igor Novikov, Martin Rees, Oscar Reula, Luciano Rezzolla, Misao Sasaki, Gerhard Schäfer, Bernd Schmidt, Alexei Starobinsky, Paul Tod, Robert Wald, and Clifford Will.

The local organizing committee involved Jiří Bičák, Michal Bursa, Petr Hadrava, David Heyrovský, Vladimír Karas, David Kofroň, Pavel Krtouš, Jiří Langer, Tomáš Ledvinka, Jiří Podolský, Vojtěch Pravda, Oldřich Semerák, Zdeněk Stuchlík, Otakar Svítek, Václav Špička, and Martin Žofka, all of them either researchers from the Institute of Theoretical Physics of the Faculty of Mathematics and Physics of Charles University or former students of the Faculty.

The program of the conference included a ceremony in the Great Auditorium of the historical Carolinum building, during which the honorary degree of Doctor of Physical and Mathematical Sciences, *doctor honoris causa*, was awarded to Prof. D. Lynden-Bell, FRS from the University of Cambridge and to Prof. Dr. W. Domcke from Technical University Munich. A reception for all participants and accompanying persons was hosted by the Dean of the Faculty of Mathematics and Physics of Charles University in the foyer next to Aula Magna. The reception was followed by an impressive concert by Škampa Quartett performing pieces by Haydn, Dvořák, Suk, and Janáček in Aula Magna.

During the conference week, the participants could visit an adjacent exhibition “Einstein, Prague and Gravitation” prepared by Czech physicists and historians and significantly enriched by the “Einstein-Wellen Mobil,” a mobile exhibition about gravitational waves brought from Tübingen by Dr. Hans-Peter Nollert. The exhibition was opened 10 days before the beginning of the conference and was visited by a great number of people, in particular by secondary school pupils.

On Wednesday, June 26, a public evening talk “Was Einstein right?—How cosmic time-keepers in space probe Einstein’s strange world” by Prof. Michael Kramer from the Max-Planck Institute for Radioastronomy, Bonn, attracted more than 500 people into the Great Lecture Hall of the Faculty of Arts of Charles University despite a EURO 2012 semifinals match taking place at the same time. This presentation on the rich aspects of pulsar physics and astrophysics can be watched at: <http://www.edumeta.com/channels/MFFUK/38889120>.

On Thursday, a late-afternoon guided tour of the Old Town, taking participants to places related to great physicists and astronomers, was followed by a conference banquet in the foundry of Emperor Rudolph II at Prague Castle, decorated by various items related to Tycho Brahe, Johannes Kepler, goldsmiths, alchemists, artists, and others drawn to Rudolph’s court. As a special “aperitif,” an organ concert was served in St. Vitus Cathedral with the last evening rays penetrating through the cathedral’s windows.

Music, in fact, framed the conference: as the participants were entering the Blue Lecture Hall for the first time on Monday morning, they were accompanied by

Madrigal stanzas by Bohuslav Martinů, a Czech composer who became a professor at Princeton and dedicated the stanzas to Albert Einstein in 1943. The same music played again on late Friday afternoon as the participants were leaving the Blue Hall at the end of the conference.

The conference was sponsored by the Faculty of Mathematics and Physics of Charles University, by the Wikow Company, and, above all, by the Karel Janeček's Foundation. Support was much appreciated by both the organizers and participants. We would also like to acknowledge the ongoing support from the Czech Science Foundation, at present realized by grant GAČR No. 14-37086G awarded to the Albert Einstein Center for Gravitation and Astrophysics.

All the contributions were refereed by the editors and by a number of colleagues at the Albert-Einstein Institute in Golm/Potsdam. In particular, we would like to thank Piotr Bizoń, Hermann Hamber, Daniele Oriti, and members of his group for their help with the refereeing process.

Finally, we would like to express our gratitude to Frank Schulz and Vera Osswald from Living Reviews in Relativity based at the Albert Einstein Institute for their great help with these volumes.

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