

# Preface

The 2013 Karl Schwarzschild Meeting on Gravitational Physics (KSM) was a top international event involving the worldwide highest qualified scientific personalities in the field of black hole physics, general relativity, and related topics. It featured the participation of 91 scientists from 15 countries over 4 continents. These attendees included undergraduate and graduate students, postdoctoral researchers, as well as junior and senior faculty. We envisioned the foundational spirit of the conference to be: “by acknowledging the past we open a route to the future.” Here “the past” refers to the pioneering black hole studies of Karl Schwarzschild, a native of Frankfurt am Main, who published his first two papers while attending the Frankfurt-Gymnasium (now the Lessing-Gymnasium) in Fürstenbergerstraße 166 in the late 1880s.

The year 2013 marked the 140th anniversary of Schwarzschild’s birth. Although inspired by the key historical work of Karl Schwarzschild, this meeting served to highlight its various repercussions in a variety of aspects of frontier theoretical physics. Black holes are no longer pedagogical curiosities of mathematics physics. Instead, these objects constitute one of the primary testbeds of the ultimate theory of nature: quantum gravity. Their presence in many distinct branches of physics is striking. Historically, this is the result of a long process started with the discovery of the Hawking effect (also known as black hole evaporation), which can be regarded as the first attempt to reconcile gravity and quantum mechanics. The Hawking effect has since contributed to the collapse of barriers between gravitation and particle physics, thermodynamics, and even condensed matter physics.

Over the past decade, black holes have become a central feature of attempts to address the hierarchy problem through the introduction of extra spatial dimensions. In such frameworks, it has become commonplace in high energy physics to suppose that microscopic black holes could be produced in current and future accelerator experiments. Black holes have also gained a more solid reception in the field of observational astronomy due to the improved technology of modern radio-telescopes and are a common topic to astronomers and theoretical particle physicists. In contrast to the various international meetings on gravitation, the KSM sought to offer a complementary program: rather than quantity, we aimed for quality.

A smaller group of eminent scientists came to review groundbreaking frontier results in gravity research by means of comprehensive plenary lectures.

As a completely new feature, we provided a worldwide platform specifically dedicated to young scientists. To foster the synergy and the collaborative spirit among senior academics and forthcoming scientific leaders, a major component of the KSM featured plenary sessions highlighting the work of the “next generation” of gravitational physicists. This included a variety of levels of researchers: young research group leaders, assistant professors, postdoctoral researchers, and even doctoral candidates. Selected senior scientists served as mentors to the group of young participants, starting off the week with a “Meet Your Mentor” session to discuss their research and career paths. A competition for “Best Student Talk” and “Best Junior Scientist Talk” was sponsored by Springer. The winners were honored at an evening gala onward the end of the week. The prize for Best Student Talk was won by Daniel Siegel (MPI, Potsdam), with Honorable Mentions going to Maximiliano Isi (Loyola Marymount University, Los Angeles), Stefan Janiszewski (University of Washington, Seattle), and Benjamin Niedner (Oxon). The prize for Best Junior Scientist Talk was awarded to Daniele Malafarina (Fudan University, Shanghai), with Honorable Mentions to Shohreh Abdolrahimi (Oldenburg University), Michele Fontanini (Sao Paolo University), Benjamin Koch (PUC, Santiago).

In a time of online-journals and electronic communication, the KSM was envisioned as not merely a venue for exchange of information, but rather as a place where new ideas are developed through complementary knowledge and encouraged interactions of the participants. We feel the conference more than met these goals. In this volume, we share the fruits of this labor.

Frankfurt am Main

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<http://www.springer.com/978-3-319-20045-3>

1st Karl Schwarzschild Meeting on Gravitational Physics

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2016, XXI, 407 p., Hardcover

ISBN: 978-3-319-20045-3