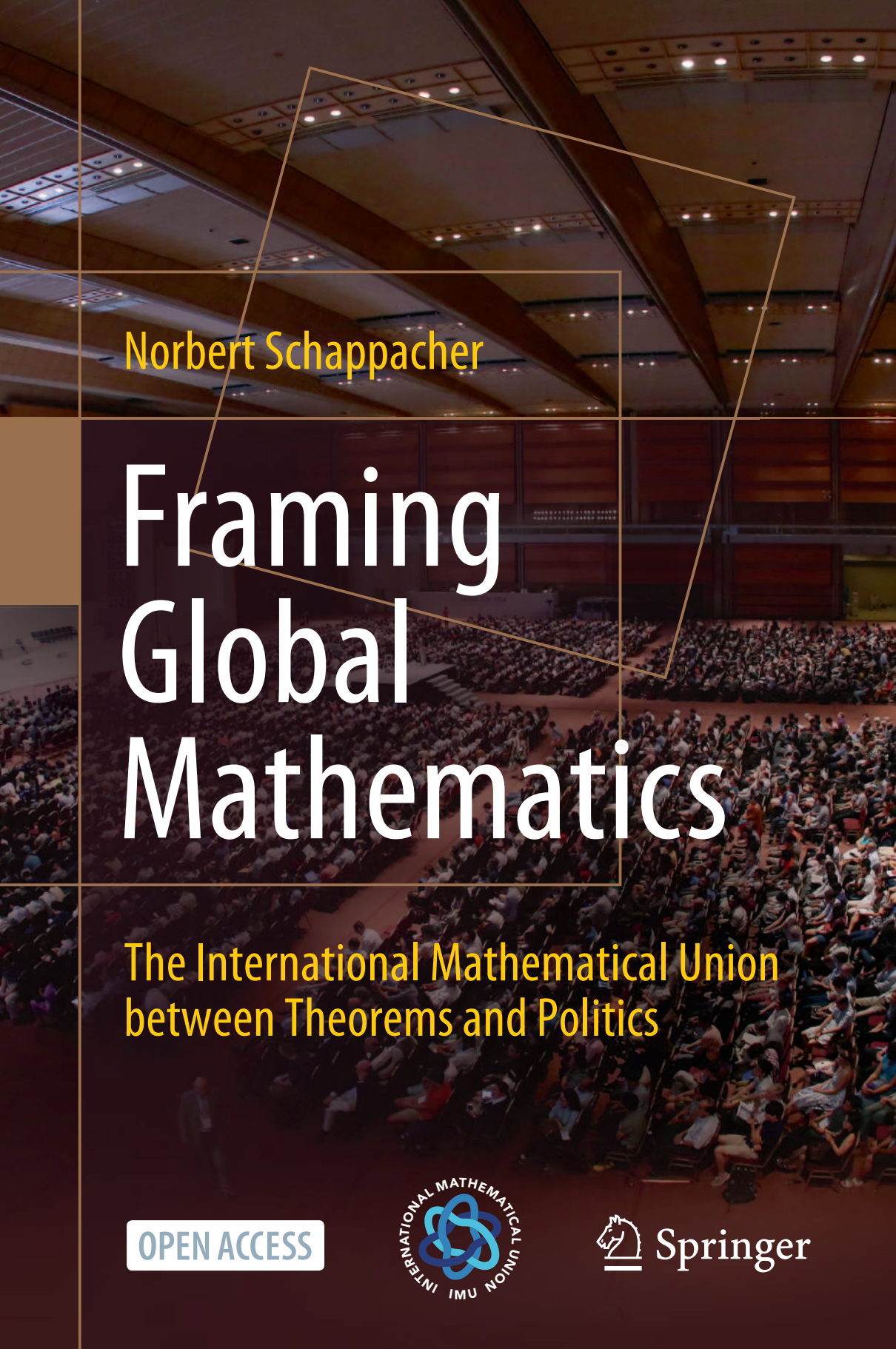
Norbert Schappacher
Framing Global Mathematics
The International Mathematical Union between Theorems and Politics
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INTERNATIONAL MATHEMATICAL UNION
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The International Mathematical Union between Theorems and Politics

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Elif için

Preface

я бы, впрочем, не пускался в эти весьма нелюбопытные и смутные
объяснения и начал бы просто-запросто без предисловия:
понравится - так и так прочтут; но беда в том, что
жизнеописание-то у меня одно, а романов два.
Главный роман второй.
.....
Обойтись мне без этого первого романа невозможно,
потому что многое во втором романе стало бы непонятным.

I would not, in fact, venture into these rather vague and uninteresting
explanations but would simply begin without any introduction
—if they like it, they'll read it as it is—
but the trouble is that while I have just one biography,
I have two novels. The main novel is the second one.
. . . . . .
It is impossible for me to do without that first novel,
or much in the second novel will be incomprehensible.

Fyodor Dostoevsky, from the preface to *The Brothers Karamazov*[1]

This book is about international relations in mathematics over the last two hundred years, since the 1820s. It focusses on institutions and organizations that were created with a view to framing the international dimension of mathematical research.

[1] Translation by Richard Pevear & Larissa Volokhonsky.

Nowadays, the organization that first comes to mind in this context is the *International Mathematical Union* (IMU), a non-governmental organization (NGO) with more than eighty member countries, whose most visible recurring activity is the orchestration of an *International Congress of Mathematicians* (ICM) once every four years. Indeed, the idea of the present book arose in 2019 from the observation that the initial variant of the IMU was founded in 1920 in Strasbourg on the occasion of the first postwar ICM. At the time it was mostly called *Union mathématique internationale* (UMI), or one of several other French names.

However, the Strasbourg Congress was not a particularly successful event in the series of ICMs, nor was it possible to celebrate in 2020 a full century of the foundation of the UMI in Strasbourg, because that *Union* had disbanded in 1932. A new, different IMU was created after World War II, in 1952. It is this second IMU which today manages the quadrennial ICMs, the Fields Medals and several other awards.

The series of ICMs had started as early as 1897, before the creation of the first IMU, and were also organized in the 1930s, when there was again no IMU. This long continuity of the congresses, which was interrupted only by the two World Wars, shows that today's IMU is the eventual outcome, but not the origin of the story of international relations in mathematics. Indeed, this story has its roots in two developments that emerged during the nineteenth century: the broad professionalization of the sciences, in particular mathematics, at universities on the one hand, and the competitive behavior of Nation states on the other.

The nineteenth century also paved the way for other crucial ingredients of today's global mathematics: the creation of research facilities and institutes outside of the universities. Their effect on international mathematical contacts and careers first became apparent between the two World Wars, in particular through Rockefeller travel grants and the founding of centers such as the *Institut Henri Poincaré* in Paris and the *Institute for Advanced Study* in Princeton.

These are the elements which place this preface—with all due respect, and in spite of its utter literary negligibility—in a position vaguely analogous to what Dostoevsky expresses in the above quote with respect to his double novel on the Karamazov Brothers. While my book converges on a portrait of today's *International Mathematical Union*, it was impossible for me to do without an exploration of its prehistory, or much in the last part would be incomprehensible.

This is why the book is organized according to three historical periods:

Part I	Chap. 1–3	The long nineteenth century until the end of World War I
Part II	Chap. 4–7	The interwar period 1919–1949
Part III	Chap. 8–10	The past seventy years.

Readers who, for instance, do not want to go through the long nineteenth century before reading about the (first) IMU, may start reading with Chapter 4; cross-references will suggest sections from Part I for additional background.

Part I traces the historical roots of scientific, and especially mathematical internationalism. The notion of internationality which is at work here originated in nineteenth century Europe. Its introduction into the world of science was conditioned and shaped by the broad professionalization of scientific research and teaching in the nineteenth century. This is the reason why Part I focusses largely on Europe, even though Japanese and Indian mathematics are also discussed.

Chapter 1 unfolds the panorama of national vs. international activities in mathematics that took place during the nineteenth century. Side glances to other sciences—chemistry, for instance, but also history—are occasionally offered to get a clearer picture of the specific situation of mathematics. In the late nineteenth century, the search for international organizations involved even the scientific Academies inherited from the age of the enlightenment. Felix Klein's project of an *Encyclopedia of the Mathematical Sciences* assumed certain kinships between nations and mathematical disciplines. Chapter 2 looks at different views of the foundational debate in mathematics before, during and after World War I. The effects of that War on mathematics and their national as well as international dimension is discussed in Chapter 3.

Part II dwells on what may have been both the most productive and the most brutally disruptive period of the twentieth century. As a consequence of World War I, the history of this intermediary period was dominated by the USA and Europe. The life and death of the first IMU, which took place between the two World Wars, is detailed in Chapter 4.

Chapter 5 describes the way in which the Rockefeller Foundation and the Institute for Advanced Study (IAS) in Princeton contributed to opening up the international perspective of many mathematicians, especially young researchers. Chapter 6 chooses Emmy Noether's personal approach to mathematics to explain why and in which way the 1920s and in particular the 1930s gave birth to many of the most characteristic features of twentieth century mathematics. We refer to this as a process of consolidation and unification of mathematics, which strongly manifested itself in the 1930s, and we trace its effects through international conferences, book publications and review journals. Chapter 7 turns to the forced displacement of scholars as well as the profound and lasting effects of World War II on global mathematics.

Part III looks at the past seventy years, the establishment of the second IMU, and the way in which this NGO has framed the worldwide community of mathematicians. It was not our intention to duplicate or to extrapolate the well-documented, partly personal account of the first half century of the second IMU by Olli Lehto.[2]

We first survey the past seventy years in Chapter 8, highlighting the effects of the evolution of world politics on the international mathematical scene. This sketch of contemporary history is then complemented, in the final Chapter 10, by a condensed portrait of the principal commissions of the IMU. The subsequent final part of Chapter 10 is dedicated to an analysis of data relating to the ICMs since 1950, which

[2] See [Lehto 1998], Chapters 4–12.

has been realized by Birgit Petri in Darmstadt. The objective is to explore in some detail the image of mathematical excellence which the ICMs of the past seventy years have projected, for the mathematical community and the interested public.

The brief Chapter 9 in the middle of Part III gives a very condensed account of the history of ICMI, the *International Commission on Mathematical Instruction*. This Commission has a longer and more continuous history than the two International Mathematical Unions, which justifies the separate chapter, if not its brevity.

Framing. We use this term in the title as well as in the text of the book. It alludes on the one hand to common expressions such as "the framers of the constitution"—see for instance the title of Section 4.1—, and on the other to framing models from the field of sociology, psychology, and communication inspired by the works of Erving Goffman, Charles Fillmore, and Marvin Minsky. Without entering into methodological arguments about this concept, suffice it to say that the phenomenon of framing assesses how individuals or institutions may use, modify, or challenge ways to apprehend activities or situations.

By managing the organization of ICMs and the way in which Fields medalists and other prize winners are selected, the International Mathematical Union is instrumental in framing a public image of the mathematical sciences. One of the goals of this book is to describe this process from different vantage points.

"Mathematics International." Throughout this book I shall occasionally use the expression *Science International* to allude to the underlying phenomenon whose history I am writing about.[3] Sometimes this is narrowed down to *Mathematics International*. I like these crisp formulas where the word 'international' cannot quite make up its mind whether it is an adjective or a noun. They allow me to allude to a whole spectrum of possible organizational structures for scientific, respectively mathematical cooperation between different nation states. The book traces the historical evolution of concrete realizations of these vague notions.

Convention. As a rule, when persons are mentioned in the narrative for the first time, they are given with their full names and their years of birth and death (if applicable). If the mention is inside a quote, the additional information is added in square brackets. These data come from publicly available sources, and have been checked as best I could. (In rare individual cases I relied on personal communication.)

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[3] This formula has been employed by others in the same context; for instance as the title of Frank Greenaway's book on the history of ICSU—see [Greenaway 1996]. Also ICSU's Newsletter Magazine was called *Science International* after the 1985 meeting at Schloss Ringberg. (This is not to be confused with any of the two online scientific journals that carry the same name today.) – There was even a Canadian Television series in the 1970s—created among others by the Berkeley differential geometer Michael Spivak—which was initially called "Science International", although it would soon be renamed to: "What will they think of next?"

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This reference section also contains: the list of the *archives* consulted; the *publications* referred to, as well as the list of *websites* referred to in the text.

Acronyms, initialisms and shortcuts used in this book are reviewed right after this preface.

Acknowledgements. I am first of all grateful to the instances of the International Mathematical Union that entrusted this book project to me and assisted its realization step by step. The central person to be mentioned here is Helge Holden, the Secretary General of the IMU. His extremely well-informed, sober advice and helpful suggestions in numerous discussions have found their way into the final version of this book in more ways than could be enumerated here. My thanks also go to the other readers of consecutive versions of the manuscript for their comments: to Nalini Joshi, Paolo Piccione, and especially to Reinhard Siegmund-Schultze.

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Strasbourg and Berlin, January 2022 Norbert Schappacher

Acronyms, Initialisms and Shortcuts

ACM	Association for Computing Machinery – Sec. 10.1.2.3.
APS	American Physical Society – Sec. 8.2.4.1.
CC	Consultative Committee (of an ICM) – Sec. 10.2.
CCC	Copyright Clearance Center – References.
CDC	Commission for Developing Countries – Sec. 10.1.3.
CDE	Commission on Development and Exchange – Sec. 10.1.3.
CFRS	Committee on Freedom and Responsibility in the Conduct of Science – Sec. 8.2.2.3.
CI	Institution of the Cupola – Sec. 10.4.2.
CIEC	Committee for Electronic Information and Communication – Sec. 10.1.1.
CIMPA	Centre international de mathématiques pures et appliquées, Nice, France – Sec. 10.1.3.
CMI	Clay Mathematics Institute – Sec. 8.2.4.2, 8.2.5.1.
CoD	Committee on Diversity – Sec. 10.1.
COSTED	Committee on Science and Technology in Developing Countries – Sec. 8.1.2.
CTI	Confederation of Intellectual Workers – Sec. 6.2.2.
CWM	Committee for Women in Mathematics – Sec. 10.1.2.3.
DCSG	Developing Countries Strategy Group – Sec. 10.1.3.
DHST	Division of History of Science and Technology – Sec. 10.1.4.
EIM	Einstein Institute of Mathematics, Jerusalem – Sec. 7.1.
ETH	Swiss Federal Institute of Technology, Zürich – *passim*.
FNP	Fields Medal, Nevanlinna Prize, or Plenary Speaker – Sec. 10.4.2.
GAMM	Gesellschaft für angewandte Mathematik und Mechanik – Sec. 10.1.

HCM Hausdorff Center of Mathematics, Bonn, Germany – Sec. 10.4.2.

IAA International Association of Academies – Sec. 1.3.2.
IAU International Astronomical Union – Sec. 1.4, 4.1.1.
ICC International Criminal Court – Sec. 8.2.4.1.
ICIAM International Council for Industrial and Applied Mathematics – Chap. 9, Sec. 10.1.
ICIC International Committee on Intellectual Cooperation – Sec. 4.2.
ICHM International Commission on the History of Mathematics – Sec. 10.1.4.
ICHS International Committee of Historical Sciences – Sec. 8.2.3.1.
ICM International Congress of Mathematicians – *passim*.
ICMI International Commission on Mathematical Instruction – Chap. 9.
ICS International Commission on Stratigraphy – Sec. 10.1.
ICSU International Council of Scientific Unions – Sec. 8.1.2.
ICTP International Centre for Theoretical Physics, Trieste, Italy – Sec. 10.1.3.
IEB International Education Board – Sec. 5.1.
IEUS International Encyclopedia of Unified Science – Chap. 6, opening.
IHES Institut des Hautes Études Scientifiques, Bures-sur-Yvette, France – Sec. 8.3.
IHP Institut Henri Poincaré, Paris – Sec. 5.1, 8.3.
IMA Institute for Mathematics and its Applications – Sec. 10.1.
IMKT International Mathematical Knowledge Trust – Sec. 10.1.1.
IMPA Instituto Nacional de Matematica Pura e Aplicada, Rio de Janeiro, Brazil – Sec. 8.3.
IMU International Mathematical Union – *passim*.
IMUK Internationale Mathematische Unterrichtskommission (the German name of ICMI) – Chap. 9.
IRC International Research Council – Sec. 4.1.
ISA International Seismological Association – Sec. 1.4.
ISC International Science Council – Sec. 8.2.2.3.
ISSC International Social Science Council – Sec. 8.2.2.3.
IUBS International Union of Biological Sciences – Sec. 1.4, 4.1.1, 10.1.2.3.
IUGG International Union of Geodesy and Geophysics – Sec. 4.1.1, 10.1.
IUGS International Union of Geological Sciences – Sec. 10.1.
IUHPST International Union of History and Philosophy of Science and Technology – Sec. 10.1.2.3.
IUPAC International Union of Pure and Applied Chemistry – Sec. 1.4, 4.1.1, 10.1.2.3.
IUPAP International Union of Pure and Applied Physics – Sec. 10.1.2.3.

KIAS Korea Institute for Advanced Study, Seoul, Korea – Sec. 8.3.
KWU The German *Kaiser-Wilhelms-Universität* at Strasbourg – Sec. 4.3.

LGTRS Locally-grounded Transnational Research Site for mathematics – Sec. 5.2; 8.3.

MPC Minor Planet Center – Sec. 10.1.
MPIM Max Planck Institut für Mathematik, Bonn, Germany – Sec. 8.3.
MPIMN Max Planck Institute for Mathematics in the Natural Sciences, Leipzig, Germany – Sec. 8.3.
MSC Mathematics Subject Classification – Sec. 10.3.
MSRI Mathematical Sciences Research Institute, Berkeley, California – Sec. 8.3.

NGO Non-governmental Organization – *passim*.

OC Organizing Committee (of an ICM) – Sec. 10.2.
ONR Office of Naval Research – Sec. 7.2.3.
OWSD Organization for Women in Science for the Developing World – Sec. 10.1.2.3.

PC Program Committee (of an ICM) – Sec. 10.2, 10.4.1.2.

RIMS Research Institute for Mathematical Sciences, Kyoto, Japan – Sec. 8.3.

SC Structure Committee (for the ICMs) – Sec. 10.2.
SCFCS Standing Committee on the Free Circulation of Scientists – Sec. 8.2.2.3.
SIAM Society for Industrial and Applied Mathematics – Sec. 10.1.
SMAI Société de Mathématiques Appliquées et Industrielles – Sec. 10.1.

TIFR Tata Institute for Fundamental Research (TIFR), Mumbai, India – Sec. 8.3.

URSI International Union of Radio Science – Sec. 1.4, 4.1.1.
UAI International Academic Union – Sec. 4.2.
UIA Union of International Associations – Sec. 1.4.
UIR *Ufficio Invenzioni e Ricerche*, Italian Office for Inventions and Research – Sec. 3.3.1.
UNESCO United Nations Educational, Scientific and Cultural Organization – Sec. 4.2, 8.1.2.
URSI International Union of Radio Science – Sec. 1.4, 4.1.1.

WDM World Directory of Mathematicians – Sec. 10.1.1.
WIAS Weierstraß-Institut für Angewandte Analysis und Stochastik, Berlin – Sec. 8.2.5.2.
WTO World Trade Organization – Sec. 8.2.4.1.

Contents