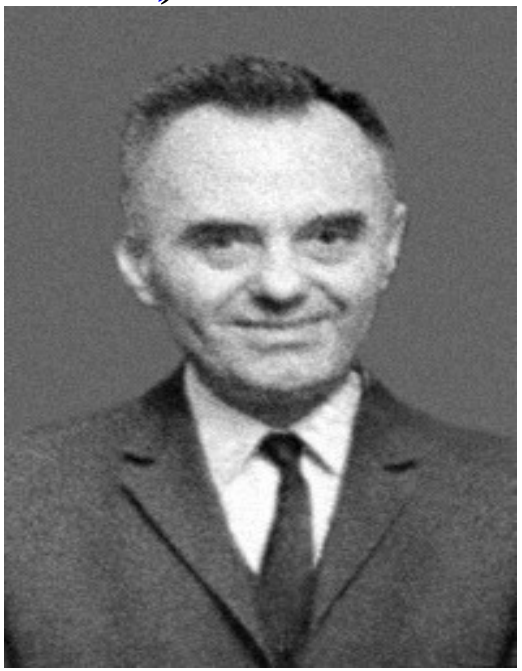
ROMAN STANISŁAW INGARDEN (1920-2011)

as a historian of physics

PERSONAL REMINISCENCES

by Józef Szudy



He was the son of Roman Witold Ingarden (1893-1970),

well-known professor of philosophy at the

Jan Kazimierz University in Lwów, and after the WWII

at the Jagiellonian University in Kraków.

After graduating from the Gymnasium in 1938, Roman Stanisław began his studies of

mathematics and physics. Here he met as a student and on private grounds at his parents' house - the elite of Polish mathematicians (StefanBanach), physicists and philosophers. They had to have a great influence on the personality of Roman S. Ingarden as a physicist.

Probably at that time he developed his broad intellectual interests, exceeding his future profession of a theoretical physicist, and including linguistics, history of science as well as biophysics and informatics.

On 1 September 1939 Germany invaded Poland from the West and then, on 17 September, the Soviets invaded from the East . Lwów was in the region occupied by the Soviets and was not returned to Poland but, in August 1945, became part of the Soviet Union.

In 1945 Ingarden left Lwów and went to Poland.

He was able to continue his studies in theoretical physics at the Jagiellonian University in Kraków under Professor Jan Weyssenhoff

1946: Ingarden obtained a Master's degree in physics from the Jagiellonian University in Kraków and then he worked for his doctorate supervised by Prof. Wojciech Rubinowicz. He was awarded his Ph.D. in 1949 by the University of Warsaw for a thesis which

. concerned <u>geometrical optics</u> with a pioneering application of differential geometry methods, in particular those of <u>Finsler geometry.</u>

1949: Roman S. Ingarden moved to Wrocław to work at the University of Wrocław. He was given the title of associate professor in 1954 and, in 1964, he became a full professor. From 1949 until 1962 he was head of the Department of Theoretical Physics at the University of Wrocław.

He was also head of the geometrical optics group at the Institute of Mathematical Sciences of the Polish Academy of Sciences from 1950 to 1956.

Papers by Ingarden on optics: *A generalization of the Young-Rubinowicz principle in the theory of diffraction* (1955);

***On the geometrically absolute optical representation in the electron microscope* (1957);**

INGARDEN AND INFORMATION THEORY

Ingarden regarded information as a fundamental physical notion which should appear in physical theories in an axiomatic manner. Originally, he mainly had optics in mind, but later on in his papers information theory appeared also in the context of statistical physics, thermodynamics and quantum mechanics.

In 1961, together with Kazimierz Urbanik, Ingarden published a paper on mathematical equivalence of the notions of probability and information, thus showing that information can well be a starting point for statistical theories.

Fascinated by the information theory Aleksander Jabłoński, head of the Physics Department of the Nicolaus Copernicus University in Toruń asked Ingarden to accept his talented young co-worker Andrzej Kossakowski for the stay in his group. Ingarden agreed and Kossakowski spent two years (1963-1965) in Wrocław working on information theory.

Aleksander Jabłoński

Andrzej Kossakowski

1965: Ingarden discussed with Aleksander Jabłoński, the founder of physics research at the Nicolaus Copernicus University at Toruń, a possible move to this Universisty.

He was appointed to a professorship in Toruń in 1966, two years before Jabłoński retired.

In 1966: Andrzej Kossakowski received his PhD in theoretical physics under R.S. Ingarden.

In the years 1966-1969 Ingarden held the Chair of Thermodynamics and the Theory of Radiation.

1968: R.S. Ingarden was a reviewer of my PhD Thesis „On collisional broadening and shifting of mercury resonance line".

My personal reminiscence: At that time I was Professor Jabłoński's co-worker and remember his discussions with Ingarden. It was Jabłoński who proposed such a name for Ingarden's Chair in analogy to the title of the famous book by Max Planck.

1969: The Institute of Physics was created at the **Nicolaus Copernicus University and** Ingarden became its first director (1969-1978).

In this Institute he built a research group of international standing.

The research conducted by his Toruń group resulted in a number of important papers on the applications Finsler geometry in statistical physics, the dynamics of open quantum systems and the geometry of quantum state spaces, quantum generalisations of entropy.

Institute of Physics of the Nicolaus Copernicus University,Toruń,

ul. Grudziądzka 5/7

In 1970 Ingarden founded the international journal

Reports on Mathematical Physics

(ROMP)

He became the first editor-in-chief of the journal.

December 6-9 grudnia 1969:

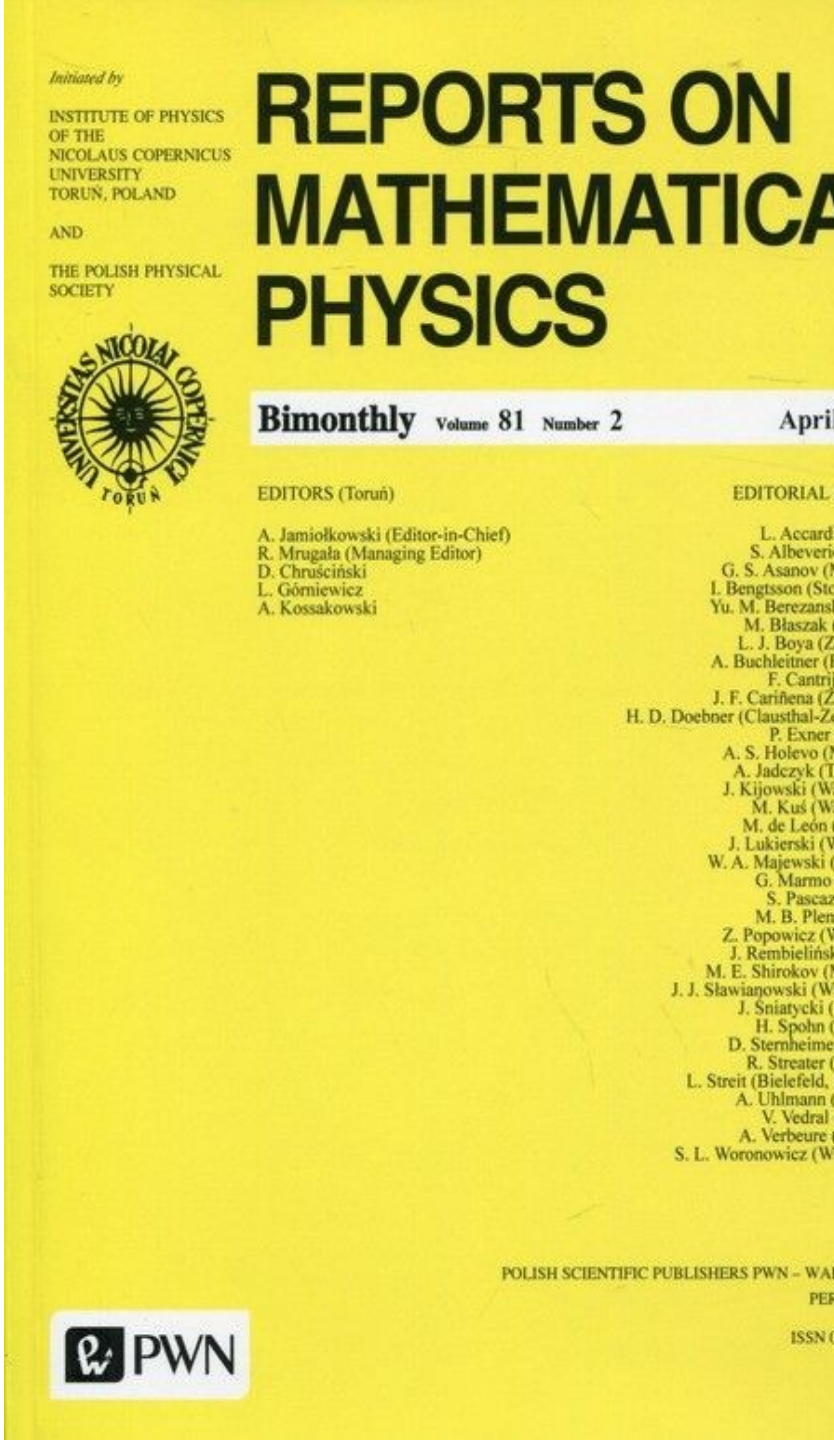
The First International Symposium on Matematical Physics

connected with the first meeting of the International Editorial Board (30 persons) of the journal ROMP.

The first issue appeared in February 1970.

Internationl Symposia on Mathematical Physics are organized in June each year.

In June 2025 the 56th Symposium was held.



1972: A. Kossakowski published in ROMP the paper „On quantum statistical mechanics of non-Hamiltonian systems" [ROMP, 3, 247(1972)] which represents his pioneering contribution to the evolution of open quantum systems (celebrated Gorini-Kossakowski-Lindblad-Sudarshan (GKLS) master equation) . This paper turned out to be of primary importance for fundamentals of modern quantum information theory.

1975: Ingarden published in ROMP the paper *Quantum information theory*, in which he developed a quantum information theory, being one of the first people to do so.

1976: Roman S. Ingarden nominated as chairman of the Comission for History of Physics of the Polish Physical Society

The first form of his activity as a historian of physics:

On December 17, 1976: an interview with Professor Aleksander Jabłoński, published in *Postępy Fizyki*, 33, 69 (1982)

April 1977: Commision for the History of Physics organized

The First Seminar on the History of Physics.

May 1979: The Second Seminar on the History of Physics.

October 17, 1980: The Third Seminar on History of Physics:

ON THE IMPORTANCE OF WITELO IN THE HISTORY OF OPTICS

WITELO (1230-1314)

The first (before Copernicus) internationally known Polish scholar who in the 13th century wrote a treatise on optics *Perspectiva* that served as the standard text on the subject for the next three centuries until the beginning of the 17th century

Witelo was a student of the University of Padova in Italy.

Painting on the wall of Padova University.

In 1604 Johannes Kepler published his famous book entitled *Ad Vitellionem paralipomena*,

quibus astronomiae pars optica traditur

(*Supplement to Witelo*, *in which is*

***expounded the optical part of astronomy*).**

Historians of science regard this book by Kepler as the first work on modern optics. By titling his book as *Supplement to Witelo*, Kepler appreciated the importance of Witelo's contribution to the development of optics. Witelo's *Perspectiva* was in the 17th century the subject of study by such outstanding scholars as Galileo, Snell, Descartes and Newton.

Since little was known about Witelo's life, Roman S. Ingarden suggested to perform studies concerning his contributions to the optics. Such studies have already started in the USA. Namely in the years 1971-1976, the outstanding historian of optics David C. Lindbergh published in the University of Wisconsin at Madison a monograph *Lines of influence of in Thirteen Century optics: Bacon, Witelo and Peckham.* He also published two papers on the theory of vision presented by Witelo.

In 1972 Lindbergh published a reprint of the printed Latin edition of Witelo's *Perspectiva* done in 1572 by Friedrich Risner at Basel. So, Lindbergh's reprint appeared 700 years after the writing of the Latin manuscript by Witelo.

1980: Roman S. Ingarden organized in the Institute of Physics of the Nicolaus Copernicus University a group consisting of:

Andrzej Bielski (optics, historian of physics),

Lech Bieganowski (ophtalmology, history of ophtalmology).

Witold Wróblewski (Latin philology)

Andrzej Strobel (astronomy, history of astronomy).

The aim of the group: translation Witelo's treatise *Perspectiva*

from Latin into Polish and give critical Commentary.

Treatise *Perspectiva* consists of Ten Books.

Lindbergh's PhD student in Madison Sabetai Unguru received in 1975 his doctorate with a thesis containing the translation of the First Book of *Perspectiva* from Latin into English with Commentary.

1991: The group of Ingarden published the Polish translatio of the Book II and Book III of Witelo's *Perspectiva:*

Part 1. Introduction on the life and activities of Witelo;

Part 2. Polish text of Book II and Book III.

POLSKA AKADEMIA NAUK
INSTYTUT HISTORII NAUKI, OŚWIATY I TECHNIKI
ZAKŁAD BADAŃ KOPERNIKAŃSKICH

WITELONA PERSPEKTYWY KSIĘGA II I III

PRZEKŁAD NA JĘZYK POLSKI
ZE WSTĘPEM I KOMENTARZAMI

Wstęp, przekład i komentarze:
Lech Bieganowski, Andrzej Bielski, Roman S. Dygdała, Witold Wróblewski

Redaktor przekładu:
Witold Wróblewski

WROCŁAW · WARSZAWA · KRAKÓW
ZAKŁAD NARODOWY IM. OSSOLIŃSKICH
WYDAWNICTWO POLSKIEJ AKADEMII NAUK
1991

In 1994: The Polish translation of Book IV with critical Commentary was published. The Book IV deals with the construction of human eye and the theory of vision.

In 2003: Books V, VI and VII;

In 2009: Books VIII and IX.

In 2015: Book X deals with astronomy and meteorological optical phenomenta in the Earth atmoshpere (rainbow).

Books

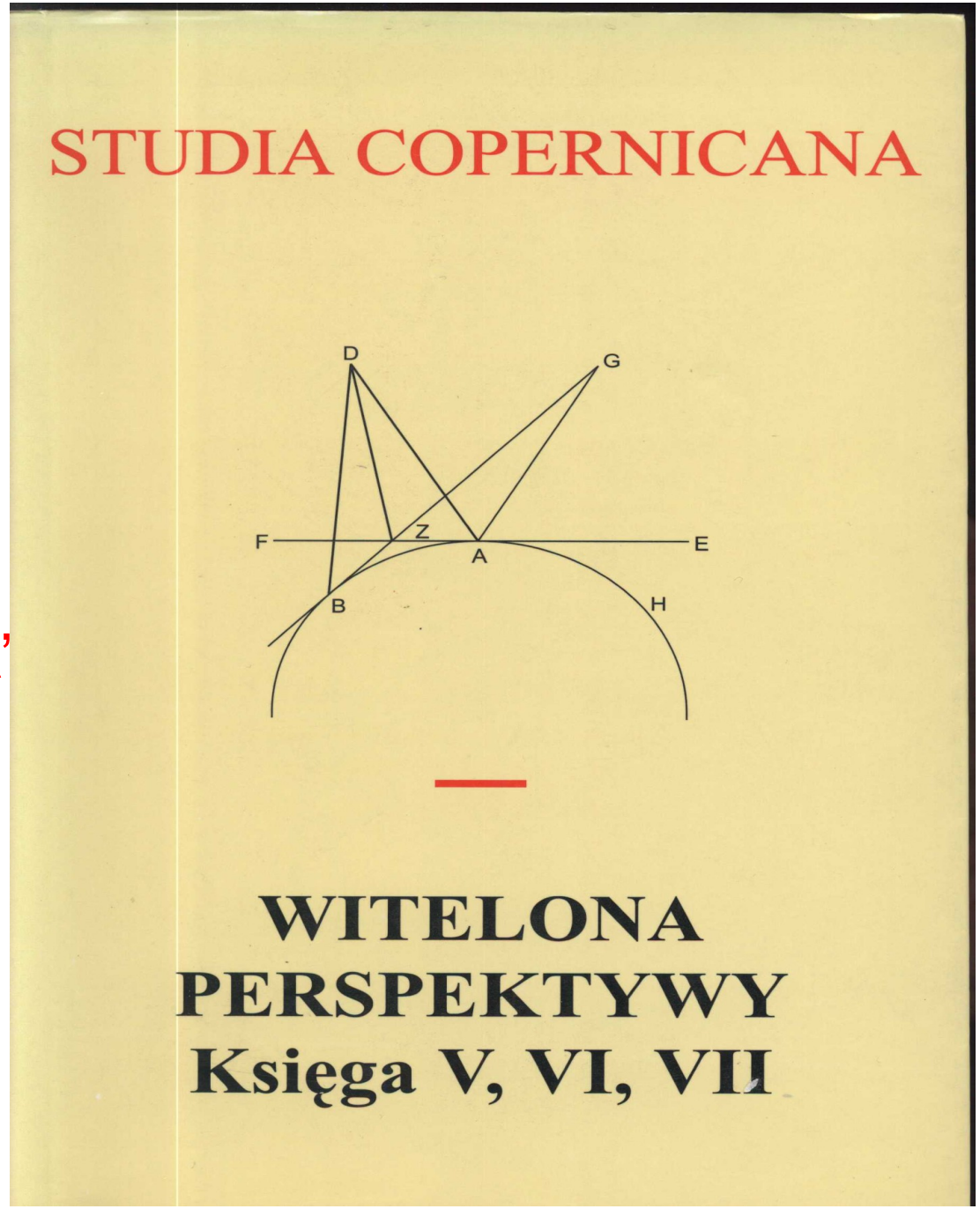
V, VI and VII

edited in

a series

„STUDIA

COPERNICANA”



September 24-29, 1979:

26th Congress of Polish Physicists in Toruń

Roman S. Ingarden organized a Special Session devoted to

100th anniversary of the birth of Albert Einstein.

October 21, 1985:

Roman S. Ingarden organized a Seminar devoted to

100th anniversary of the birth of Niels Bohr

He delivered a plenary talk:

Paradoxes of Niels Bohr.

September 19, 1988:

The Fourth Seminar on History of Physics:

GALILEO, NEWTON AND FAHRENHEIT AND THE DEVELOPMENT OF THE NOTION OF TEMPERATURE

August 19-24, 1991:

International Conference on:

„Teaching about Reference Frames from Copernicus to Einstein”.

Organized jointly with GIREP Groupe International de Recherche sur l’Enseignemen de la Physique (International Research Group on Physics Teaching).

Chair of Organizing Committee: dr Józefina Turło.

Roman S. Ingarden published a number of textbooks as well as monographs:

1979: ***Classical Electrodynamics*** **(with Andrzej Jamiołkowski),**

1980: ***Classical Mechanics*** **(with Andrzej Jamiołkowski);**

1981: ***Mathematical analysis for physicists*** **(with Lech Górniewicz);**

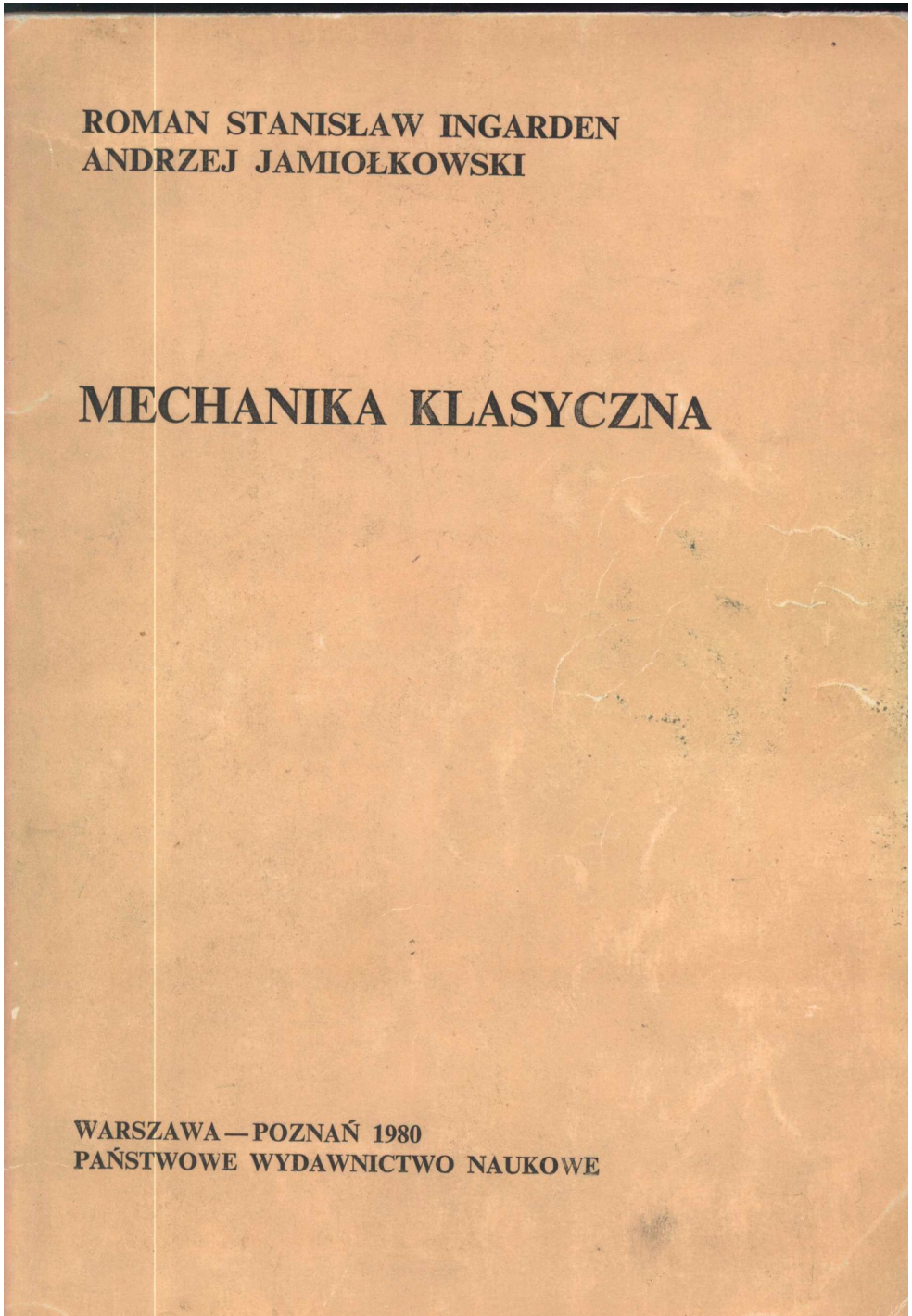
1989: ***Quantum mechanics: in a Hilbert space setting*** **(with Marian Grabowski);**

1990: ***Statistical physics and thermodynamics*** **(with Andrzej Jamiolkowski and Ryszard Mrugała);**

1993: ***Algebra and Geometry for physicists*** **(with Lech Górniewicz)**

Textbook

Classical Mechanics

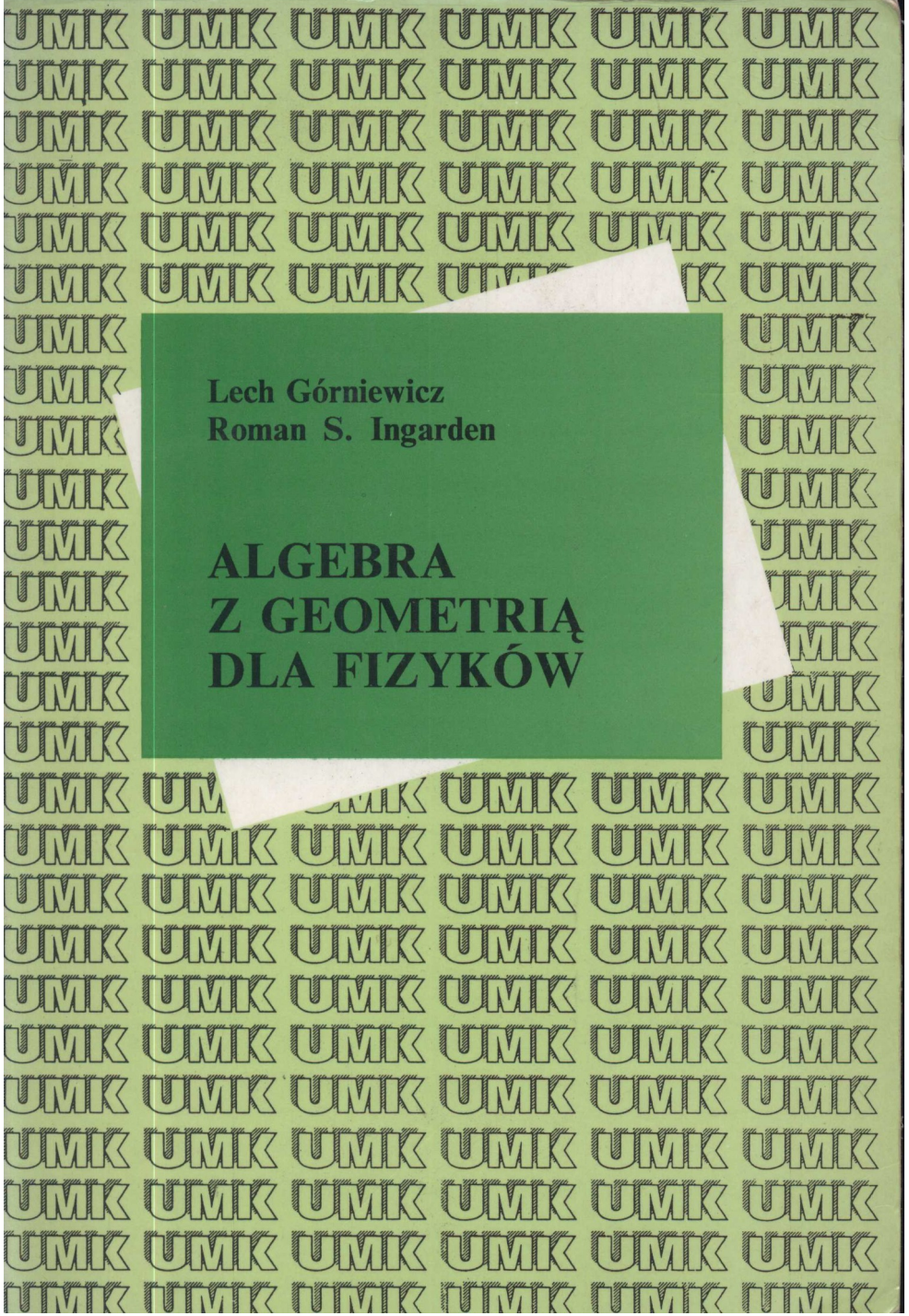


Textbook on algebra

and geometry for physicists

(with Lech Górniewicz from

the Department of Mathematics)



RSI:

Ingarden's fascination with Japan and Japanese science:

In 1980's: Several visits of Ingarden in Japan:

Tokyo Institute of Technology

and Tokyo University of Science.

Cooperation with Masanori Ohya on quantum information theory and communication processes.

Ingarden decided to learn the Japanese language soon after taking up the position in Toruń.

This was not simply a personal hobby, for he became a founder of the Japanese Language and Culture Centre at the Nicolaus Copernicus University in Toruń..

Ingarden and Ohya collaborated to launch a new journal on mathematical physics and quantum information, which is named

Open System and Information Dynamics

and it is now highly recognised among mathematical periodicals.

Journal OSID

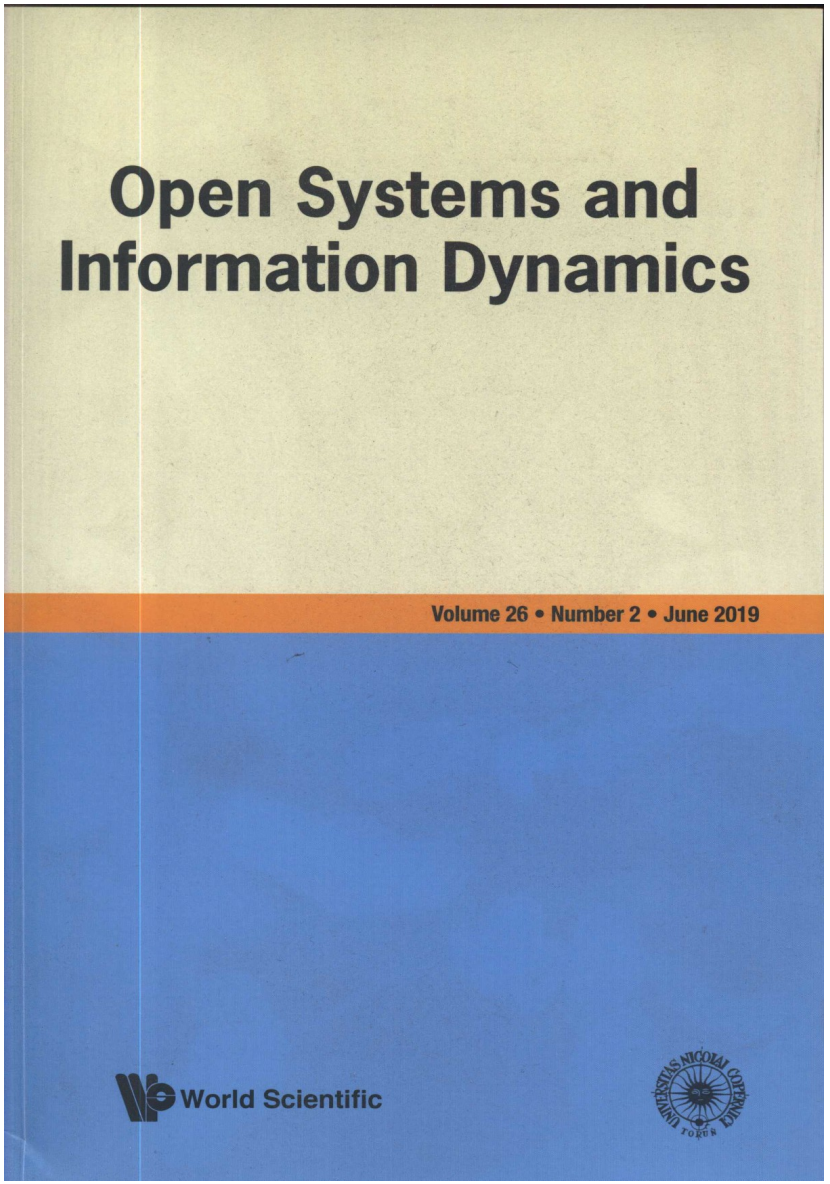
Editor-in-chief:

R.S. Ingarden and

M. Ohya;

Edited by World Scientific.

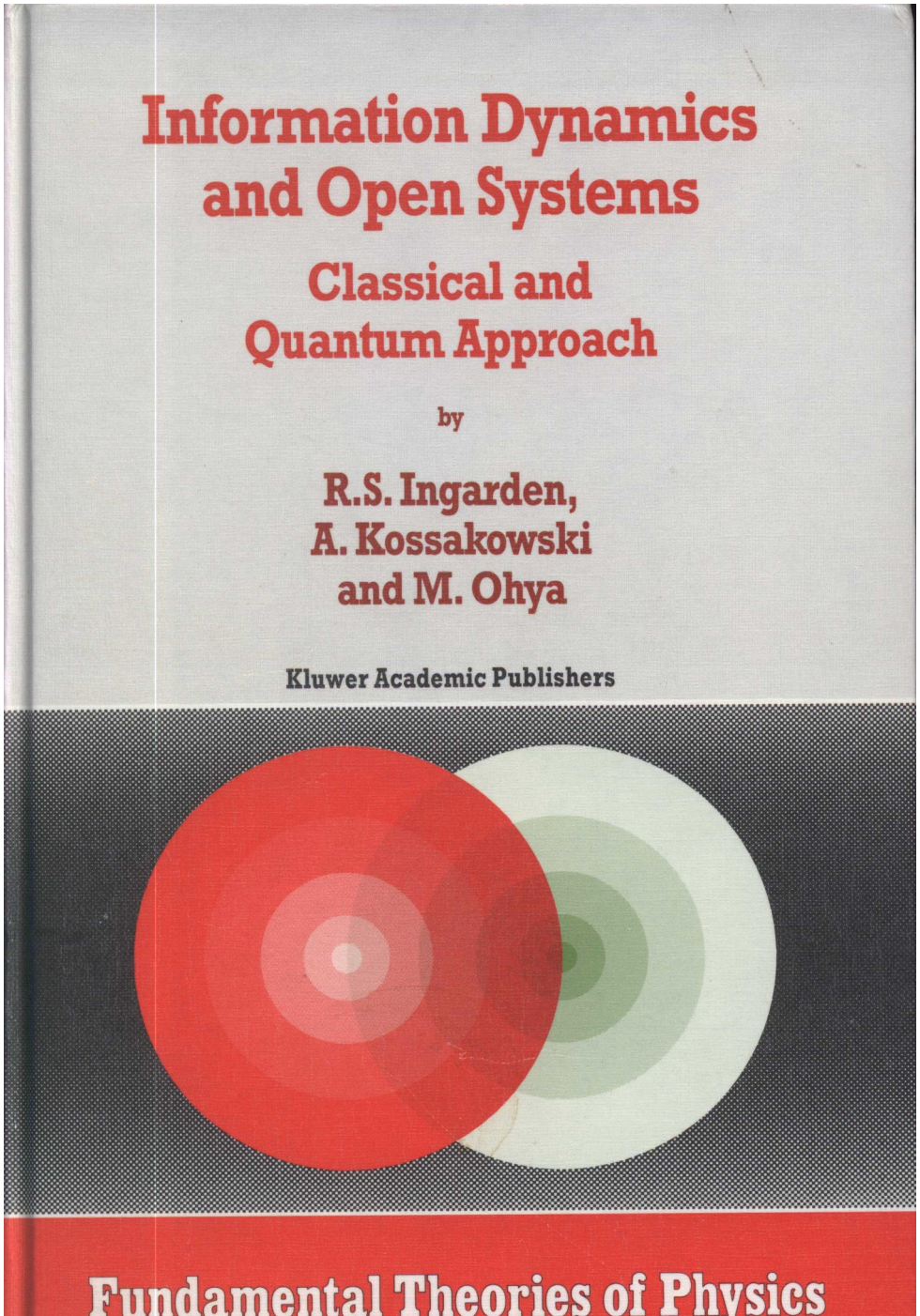
In 2002 Roman S. Ingarden was awarded the Order of the Sacred Treasure by Emperor Akihito of Japan.



Monograph by

R.S. Ingarden,
A. Kossakowski, and
M. Ohya.

Edited by
Kluver Academic Publishers



1994: Book by R.S. Ingarden:

„Physics and physicists"

Essays on the history and Pholosophy of physics.

Chapter I: ***Witelo and his times;***

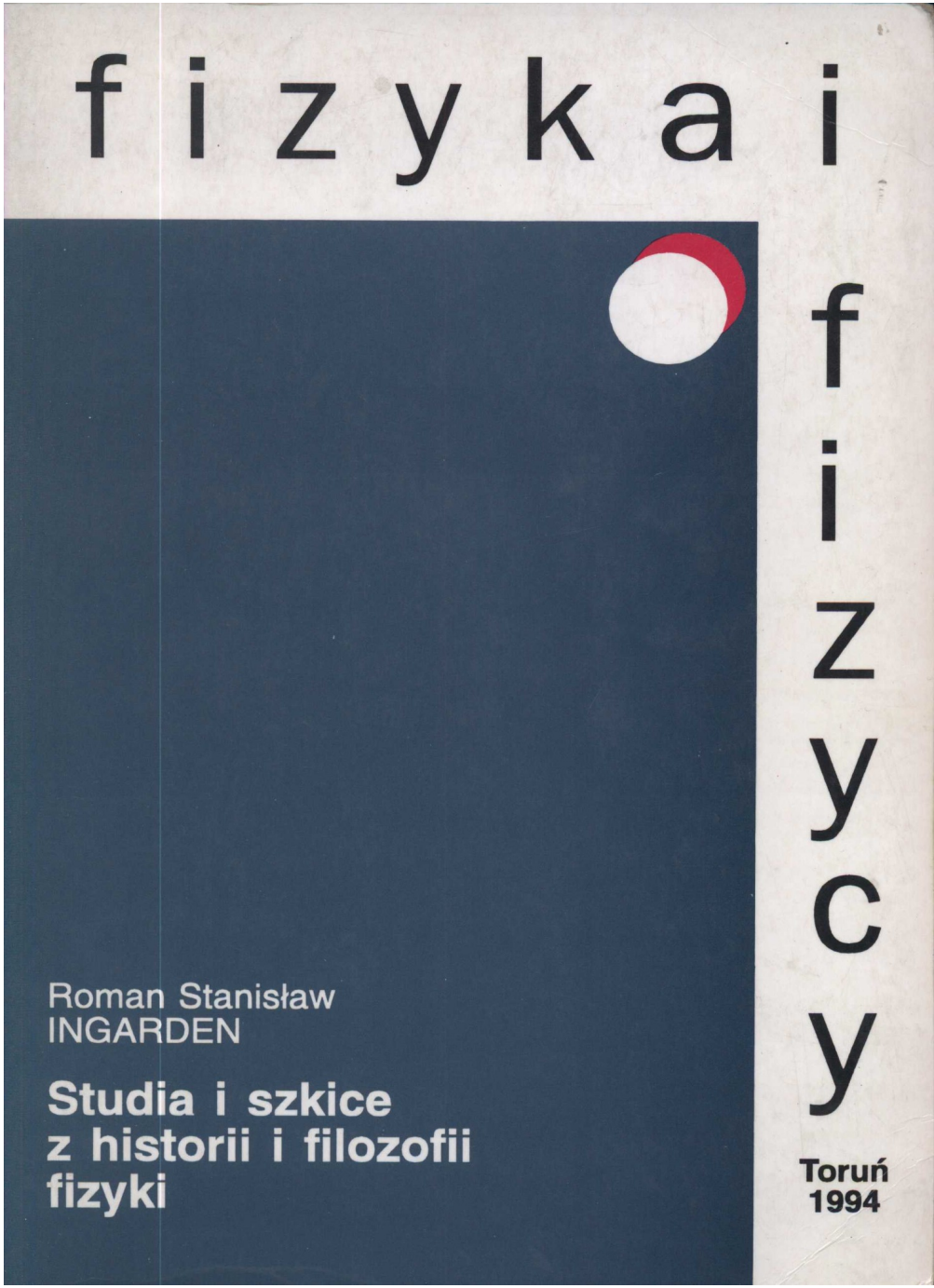
Chapter II:

Nicolaus Copernicus

Chapter III:

Descartes, Galileo, Newton;

Chapter IV: ***Mieczysław Wolfke, Wojciech Rubinowicz and the beginning of quantum optics.***



August 4-11, 2002: Internalional Conference „Ideas of Albert Abraham Michelson in mathematical physics", took place in the Mathematical Conference Center at Będlewo near Poznań.

R.S. Ingarden delivered a lecture „*Albert Abraham Michelson: his life, and his importance for mathematical physics*" during the opening ceremony of this Conference.

Moreover, with Julian Ławrynowicz he gave a plenary lecture dealing with the application of the Finsler geometrical approach to gauge theories that yields the field theory containing solitons as solutions of the field equations.

The Conference was organized

by Julian Ławrynowicz and

Jakub Rembieliński, professors

of the University of Łódź

to commemorate the

150th anniversary of

A.A. Michelson's

birth on December 19, 1852

at Strzelno.

The plaque found

Albert Abraham Michelson – the first American citizen to win the Nobel Prize in physics.

On August 7, 2002 one day excursion of participants of the Conference from Będlewo to Strzelno took place. Here a popular session was held in the Strzelno Secondary School and R.S. Ingarden gave a talk „Michelson and interpretation of modern physics".

He received the title Doctor honoris causa of the Nicolaus Copernicus University.

Roman Stanisław Ingarden died on July 12, 2011 in Kraków.