This issue is dedicated to
Professor Iwo Białynicki-Birula on
the occasion of his 90th birthday

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Preface

In 1952, an unknown student from the Mechanical Technical High School in Rzeszów, a provincial city, took first place (along with two other participants) in the First Physics Olympiad — a prestigious contest organized by the Polish Physical Society. Apart from the great splendor that befell this young student, the victory allowed him to avoid mandatory (due to the regulations of that time) employment in one of the local factories and opened the route for him to study at the University of Warsaw. There, he quickly came under the guidance of outstanding theoreticians led by Professor Leopold Infeld. This is how the successful scientific career of Professor Iwo Białynicki-Birula began, as well as that of all his students and collaborators, who for decades have been continuously drawing on his incredible intuition, brilliance, and kindness. Just as physics and the world have been changing over the past 70 years, the memories of his students who came under his mentorship are surely diverse. However, what definitely unites them all is the belief in the incredibly profound physical intuition of Our Professor, which he constantly expresses in one of his most beloved sayings: *Przyroda jest łaskawa* (eng. *Nature is kind*). Indeed, striking is his readiness to undertake risky and sometimes slightly controversial research directions. Who else, if not the Professor, would have dared to question the validity of the widely used Feynman's proof [1] or to construct a consistent formulation of a nonlinear correction to, by definition linear, quantum mechanics [2, 3]? Only the Professor and his wife, Professor Zofia Białynicka-Birula, could envision and later prove that photons can undergo splitting in an external magnetic field [4] or that the uncertainty principle, similar to that of massive particles, can also be formulated for quanta of light [5, 6]. Once, for purely bureaucratic reasons, I asked the Professor what I should put in the "scientific interests of the supervisor" section of a certain form. Without hesitation and with full conviction he answered: *Theoretical Physics*. Although quantum electrodynamics is his greatest passion, his horizons extend to all corners of contemporary physics, where he always finds interesting questions that are still awaiting answers.

On the occasion of Professor Iwo Białynicki-Birula's 90th birthday, I invite everyone to read this special issue of *Acta Physica Polonica A*, in which his students, collaborators, and friends publish scientific papers from their respective fields of expertise. The richness of the topics covered and references to the Professor's scientific activities once again demonstrate how versatile and respected a scientist he is.

Happy Birthday, Master!

Tomasz Sowiński

Guest Editor

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[3] I. Bialynicki-Birula, J. Mycielski, *Ann. Phys.* **100**, 62 (1976)

[4] Z. Bialynicka-Birula, I. Bialynicki-Birula, *Phys. Rev. D* **2**, 2341 (1970)

[5] I. Bialynicki-Birula, Z. Bialynicka-Birula, *Phys. Rev. Lett.* **108**, 140401 (2012)

[6] I. Bialynicki-Birula, Z. Bialynicka-Birula, *Phys. Rev. A* **86**, 022118 (2012)

Contributions: