

## EDITOR'S INTRODUCTION

“Who on earth is going to read all these papers? They are almost as old as I am.” With this question my father would usually open the discussion of the edited versions of his papers as I brought them to his attention one by one. On one occasion I asked him to elaborate. “My doubts are not about the papers,” he laughed. “They have not changed, unlike the fashions in science.”

For this collection V.A. Ambartsumian selected several papers which have already proven to have a tremendous impact on their respective fields. The eighth paper in this collection, which presents the method of addition of layers, is a good example. In their book *Invariant Imbedding & Radiative Transfer in Slabs of Finite Thickness*, R.E. Bellman, R.E. Kalaba and M.C. Prestrud write that “As a result of this pioneering work, new analytic treatments were made available and simplified computational solutions were obtained. These ideas were further developed and extensively generalized by Chandrasekhar in a series of fundamental papers and in 1950 in his book....Many otherwise intractable problems were tamed, and great advances were made.”<sup>1</sup> The invariance principle introduced by this paper has since found widespread application even in fields distant from astrophysics.

In choosing papers for this collection Ambartsumian also gave preference to those which, in his opinion, retain potential for future development. In earlier years he would often advise me to spend more time reading the scientific classics of the past. He firmly shared the old belief that, along with seeds which have since grown and produced scientific fruit, those classical works still contain many other seeds that remain hidden and await their chance for development. I assume that this belief, as applied to his own work, influenced my father's selections. For instance, Ambartsumian's first Solvay lecture, delivered in 1958, concerning the explosion of nuclei of the galaxies, was groundbreaking. That first lecture and the development

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<sup>1</sup>American Elsevier Publishing Co., 1963, p. 1.

it started were described by Jerzy Neyman in his article “Reminiscences of a Revolutionary Period in Cosmology.”<sup>2</sup> As Neyman recalled, despite initial skepticism, “Ambartsumian’s arguments and many-sided documentation made the attending scholars think, and there followed several important international developments....” Neyman concluded that “Evidence in favor of the Ambartsumian Hypothesis is now overwhelming. My hearty congratulations to Professor V.A. Ambartsumian, the Copernican Revolutionary...!”

In preparing his second Solvay report, presented at the 1964 conference in Brussels, Ambartsumian had the benefit of numerous observations made in the intervening six years, which he used to considerably refine and develop the ideas outlined in the earlier lecture. Ultimately, he chose to include in this collection the second, more elaborate report (paper 19), rather than the first, more famous lecture. He could not avoid contemplating the chance of a recurrence of events such as he witnessed several times during his life, when ideas he had planted grew to provide splendid scientific results. Now, after he has passed away, I recall the following episode. During my editorial work on “Flare Stars,” I became absorbed by the fascinating statistical problem the paper raises and wrote some mathematical comments, which I presented to my father. His reaction: “Put it in. After all, the purpose of all this is the further development of what has already been done.” These comments are presented here as an addendum to paper 16.

The papers in this book are presented chronologically. However, they can be viewed as falling into two main groups. The first is the series which takes the reader successively from individual stars (papers 5, 16 and 17), multiple systems and star clusters (papers 6 and 13), associations and superassociations (papers 12, 15) into the world of galaxies (papers 18-22). The methodological and conceptual interconnection between these papers can be briefly described by H. Alfven’s expression: “Science versus Myth.” Among the weapons science uses in this struggle, mathematics is not the least important, and the papers of the second group (the remaining papers in this volume), complementary to this series, testify to Viktor Ambartsum-

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<sup>2</sup>*Problems of Physics and Evolution of the Universe*, Publishing House of the Armenian Academy of Sciences, Yerevan, 1978, pp. 243-250.

ian's supreme mastery of the weapon of mathematics. In this connection, in his paper "Computed Tomography: Some History and Recent Developments," published in *Proceedings of Symposia in Applied Mathematics*, (Volume 27, 1982), Nobel Laureate A. M. Cormack made the following comment pointing to the relation of my father's work to computer tomography: "Ambartsumian gave the first numerical inversion of the Radon transform and it gives the lie to the often made statement that computed tomography would have been impossible without computers." The opening paper in this collection presents the first "inverse problem" ever solved. Now there are journals and series of monographs in mathematical physics which include in their titles that very term, coined by Ambartsumian in his first paper.

The papers are presented here with minor editorial changes and abridgements. Our general purpose in editing was to make the texts more precise. However, more serious abridgements have been made in papers [3], [13] and [17], where my father selected only those sections of the original papers which in his judgement have retained the most value. Among the texts now in this book, those which existed only in Russian have been translated from the three-volume collection of Ambartsumian's papers published in 1960 (Volumes 1 and 2) and 1988 (Volume 3) by the Armenian Academy of Sciences, Yerevan. In cases where an English version existed, it has been used here. However, some minor changes have been made in conformity with the corresponding texts in the Armenian Academy volumes. The original papers and translations were not always uniform in style and format, as well as in form of citation, and much of that variation has been preserved here as well.

The publication of several papers in the collection has been possible only with the consent of their owners, who are acknowledged herein and whom we thank for graciously allowing us to include these articles. Finally, I would like to express the hope that the reader will perceive in this collection depth and originality of the analyses and dynamic development of the topics — qualities that are always in fashion.

Rouben Ambartsumian  
Yerevan, January 1998