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Alv Egeland • William J. Burke

Carl Størmer

Auroral Pioneer

 Springer

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Preface

Naturally occurring phenomena in the heavens have been observed and enjoyed for at least as long as the historical record. Few have stirred the human imagination with curiosity and fear as much as aurora or as they are often called in the Nordic countries, *Northern Lights*. The words “aurora” and “northern lights” refer to the same phenomenon. The aurorae certainly rank among one of nature’s most spectacular displays that can be seen with the unaided eye. Unfortunately, auroral displays can only be seen on dark, cloud-free nights by people living near polar latitudes. Since northern Scandinavia is located in the zone of maximum auroral occurrence, these majestic lights have been observed as ordinary parts of life for centuries.

The purpose of this book is to summarize the seminal contributions to auroral science of Carl Størmer (1874–1957), who was first to apply precise methods of data collection, to calculate accurate heights of different auroral forms, the trajectories of auroral particles in the Earth’s magnetic field and to develop first realistic auroral models. Størmer carefully photographed and mapped auroral characteristics over the course of four solar cycles. His work is still cited in review papers. Through his investigations of auroral effects, Størmer helped establish the solid foundations on which present-day space research has been built.

Across the decades since 1955, Størmer’s book *The Polar Aurora* stands as a regularly cited guide in graduate-level courses on space physics. Størmer recognized that he had been given opportunities to compile measurements of unprecedented high-quality auroral properties. Still, on page 89 of *The Polar Aurora*, he conceded that his analyses of auroral characteristics contained in his data were “far from complete.” However, one cannot help but stand in awe in the presence of Størmer’s comprehensive calculations, all carried out prior to the introduction of electronic computers as tools of scientific research.

Beyond auroral science, Carl Størmer contributed in other ways to Norway’s cultural history by systematically taking candid photographs of famous artists, politicians, and academic personalities between 1890 and 1900. Thus, Størmer’s covert pictures of the play-write Henrik Ibsen walking on Karl Johans Gate (street) are used in official Norwegian documents to this day.

During the 1974 Nansen Memorial Lecture on Aurora at The Norwegian Academy of Science and Letters, Professor Leif Størmer (1905–1979), then Dean of the Mathematics and Natural Science Faculty, explored the possibility of donating all of his father’s auroral documents to the University of Oslo. He hoped that one day someone would go through all Størmer’s scientific works and write his story from the perspective of their impacts on auroral physics in the space age. Unfortunately, it has taken a long time for Størmer’s biography to be written. Reflecting on his accomplishments and doors to the future he opened, we became convinced that a review of Carl Størmer’s life and work by space scientists whose careers spanned the post-Størmer decades would provide perspectives not easily replicated by purely academic historians.

For the most part this book is written in a form that requires little background in mathematics or physics. Segments of Sects. 3.6 and 3.8 as well as the two appendices require some mathematical experience and thus may only be of interest to specialists. It is not necessary to read the book fully from beginning to end to gain an understanding of this outstanding man. List of Carl Størmer’s publications, sorted by subject, together with sources and bibliography, are at the end of this document. We explicitly referenced only those photographs and illustrations that came from neither Størmer’s publications nor his family’s archives. While not all of Størmer’s papers mentioned in the text appear in the Bibliography, they can all be found in the list of his publications.

We gratefully acknowledge the generosity of Carl’s three grandsons, Fredrik Størmer, Ph.D.; Erling Størmer, Professor Emeritus of Mathematics at the University of Oslo; and especially Georg Størmer, former Finance Director at Norsk Hydro Norway’s largest industrial entity, for providing us with copies of family diaries as well as with many photographs. The diaries proved invaluable for appreciating Carl Størmer as a private and family man. The authors benefited from lengthy discussions about the Størmer family with Georg Størmer. We also thank Espen Trondsen and Bjørn Lybekk at the University of Oslo for coordinating our work during the final preparation of this biography and Geir Holm for improving the quality of several old illustrations. AE is also very thankful to Professor Jøran Moen for his practical and financial support. The work of WJB was supported in part by the Air Force Office of Scientific Research under a contract with Boston College.

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