OBSERVATORIES AND TELESCOPES OF MODERN TIMES

Ground-Based Optical and Radio Astronomy Facilities since 1945

This volume gives an historical overview of the development of professional optical and radio observatories from 1945 to today. It covers the environment in which these facilities were developed by organisations in the United States, Europe and elsewhere, often led by larger-than-life individuals, as well as exploring the financial and political factors that both constrained and encouraged progress. As progressively more expensive optical facilities were built, they exploited new technologies to significantly improve their performance: CCDs, active and adaptive optics, and spun honeycomb and segmented mirrors. The second half of this volume turns to the parallel history of radio astronomy facilities throughout the world, finishing with the ALMA observatory in Chile. This is the ground-based companion to the author's previous work on space astronomy, *New Cosmic Horizons*; it is written for both technical and non-technical readers interested in the modern history of astronomy and its observational facilities.

DAVID LEVERINGTON received his first degree in Physics from Oxford University in 1963. Since then he has held a number of senior positions in the space industry, working for both the European Space Agency and British Aerospace (now BAE Systems) before taking early retirement in 1992. Subsequently he has written four books: *A History of Astronomy from 1890 to the Present* (Springer-Verlag, 1996), *New Cosmic Horizons: Space Astronomy from the V2 to the Hubble Space Telescope* (Cambridge University Press, 2000), *Babylon to Voyager and Beyond: A History of Planetary Astronomy* (Cambridge University Press, 2003) and *Encyclopedia of the History of Astronomy and Astrophysics* (Cambridge University Press, 2013). He was also technical consultant for ABC-CLIO's *Space Exploration and Humanity: A Historical Encyclopedia* (2010) supported by the History Committee of the American Astronautical Society. He was awarded his PhD in 1997.

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Preface

This book is a history of modern astronomical observatories and their telescopes. As such it covers the history of optical/infrared and radio/microwave observatories and telescopes that have been built since the Second World War. I have tried to cover the most innovative and trend-setting professional facilities and, as a result, I have excluded a discussion of most of the optical observatories established before the war even though some of them were still adding telescopes after 1945. This is because most of their new telescopes, with few exceptions, were not really innovative.

In many ways, the Palomar Observatory can be seen as the last of the major prewar optical observatories as its first telescope, its 18/26 inch (46/66 cm) Schmidt, was built in the mid 1930s and its two main telescopes, the 200 inch (5.1 m) and the large Palomar (Oschin) Schmidt, were largely designed before the war. So maybe it should be excluded from this book, even though building of its two main telescopes was not completed until the late 1940s. But Palomar designs were innovative in many ways, setting the standards for large optical telescopes and observatories for some time to come. Consequently, I have begun my narrative with a brief outline of the design and development of the Palomar Observatory.

Ground-based astronomical observatories these days consist of more than just optical/infrared and radio/microwave facilities. For example, a number of neutrino, cosmic-ray, gamma-ray and gravity-wave observatories have been built, but I have excluded these to avoid complicating the book. Likewise, I have excluded small professional and large amateur facilities, interesting though many of them are, as this would take the book into completely new territory and make it considerably longer.

Discussing the history of professional astronomical observatories has its challenges as there are so many of them and their histories are often interconnected. It is theoretically possible to consider their history as one large interconnected story, but to produce a readable text I would have had to leave out interesting details

which, in my opinion, would have made the book less interesting. So I have taken the alternative approach of considering their histories observatory by observatory whilst pointing out, where appropriate, how their histories are linked. Although this makes the book read a little more like an encyclopedia, I hope it is all the clearer for that enabling me to describe the unique circumstances that have led to the foundation and development of each observatory in turn.