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Jan Guichelaar

Willem de Sitter

Einstein's Friend and Opponent

 Springer

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Amsterdam, The Netherlands

This book draws, in part, on the author's earlier work in Dutch: "De Sitter, Een alternatief voor Einsteins heelalmodel", Veen Magazines, Amsterdam, 2009. [De Sitter, An alternative for Einstein's model of the universe].

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*This book is dedicated to my children Jan
and Clasina*

Preface

It is a strange chance that, of his most conspicuous contributions, one should relate to the Jovian system—first fruits of the invention of the telescope—and the other to the remotest systems that the telescope has yet revealed.

Arthur S. Eddington¹

At the wall in the drawing room of my grandfather's house, next to the primary school where he was headmaster, a famous photograph of the Andromeda Nebula hung in the 1950s. As the son of a barber in a small Frisian village, the only way for the bright young boy to study was to attend a teacher training college, in The Netherlands sometimes called *the university for the poor*. His interests and capacities went further than the primary school teachers' level. In his youth, the universe consisted only of the visible galaxy, in the years that the Milky Way was still visible nearly everywhere in the Netherlands. He explained the Milky Way to me by roughly drawing evenly distributed dots, the *stars*, on two glass saucers. Putting one upside down onto the other, he had made a model of our galaxy. If you looked perpendicular on the saucers, you saw the stars at their normal distances. But if you looked in the plane of the two saucers, you saw the dots seemingly close to one another, forming a *Milky Way*. It was my first insight into cosmology.

In his youth, the complete universe consisted of our own galaxy, nobody supposed anything outside it. But in the 1920s, the first distances to the nebulae were measured and they turned out to be complete galaxies of their own, at extremely large distances. It must have made a great impression on the young teacher. Roughly thirty years later, his interests in astronomy had not abated. One of his daughters presented him with a telescope, which had a maximum magnification of 150. As a delighted young boy he, an older man not long before his retirement, put up his telescope night after night to see the wonders Galileo had seen 350 years

¹Arthur S. Eddington in his obituary on Willem de Sitter in *Nature* (CXXXIV, December 15, 1934).



The Andromeda Nebula

earlier: the mountains on the Moon, the phases of Venus and the four great moons of Jupiter. Some of these sights I remember when I stayed there during holidays, at the teacher's house in a small village in the eastern part of the province of Groningen, in those days not yet connected to the main water supply, nor the gas and electricity networks. Shortly before his death, he presented the telescope to me. As a theoretical physicist, I was not active as an amateur astronomer and the box with the telescope has been stored in the garage or cellar most of the time. The last time I used the telescope was in June 2017, when friends of mine had taken the telescope to their second home in Liguria in Italy, ten miles north of Ventimiglia. When I visited them a couple of days, we put up the telescope, and on a perfectly clear night, we had a beautiful view of Jupiter and his four Galilean moons, two on either side of the small disc. I dare say that my grandfather played a role in arousing my interest in astronomy.

So it is not surprising that I chose as my topic for a biographical research the life and work of the Dutch astronomer Willem de Sitter (1872–1934), because his work knew two main topics: a new theory for the four Galilean moons of Jupiter on the basis of classical celestial mechanics, and the description of the later called De Sitter Universe on the basis of Einstein’s general theory of relativity.

Explanatory Notes

- The first version of this book was written in the years before 2009. In that year, a shortened version of the current book was published in Dutch: *De Sitter, An alternative for Einstein’s model of the universe* (Dutch: *De Sitter, Een alternatief voor Einsteins heelalmodel*); Veen Magazines, Amsterdam, 2009. The present biography is an extended version, including a number of new aspects. The complete scientific account with all necessary footnotes and literature references, for which there was no place in the Dutch book, is incorporated in the present book.
- In the ongoing texts, the references to letters (mostly from and to De Sitter) and a number of (dated) documents are given between square brackets. If the writer and receiver of the letter(s) are clear from the text, only the abbreviation of the archive—and sometimes a number and code—and the date of the letter are given. If the name is not clear, it is given also between the square brackets.
- A number of drawings were made using the drawing program GeoGebra.
- The photographs are for a large part, with the permission of the Leiden Observatory, taken from the archive of De Sitter in the University Library of Leiden. Another part is taken from several family archives with the permission of the owners. A number of pictures and photographs are from the author’s personal archive. There are a number of photographs from other sources, and a few photographs (all more than a century old) were free of rights available in the public domain. The sources are given in the text as completely as possible.

Amsterdam, The Netherlands
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Acknowledgements

In the first place, I am indebted to Anne J. Kox, emeritus Pieter Zeeman professor in the history of physics at the University of Amsterdam. In 2006, he mentioned to me the lacuna in the research into the work of Willem de Sitter and gave me advice during my research. For many stimulating discussions, I owe many thanks to Bastiaan Willink, retired sociologist and historian of science, and a close friend since 1951.

Many thanks I owe to a number of family members of Willem de Sitter, who provided me with information. First, W. Reinold de Sitter (who died in 2009), son of Willem de Sitter's son and geologist Lamoraal Ulbo, who told me in a number of conversations frankly and with humour a lot of relevant facts concerning the De Sitter family. Besides, I could use the result of his own work on his grandfather.² I am also indebted to Reinold's brother Lamoraal Ulbo and sister Tjada van den Eelaart-de Sitter, to Willem Jan de Sitter, son of Willem de Sitter's son and astronomer Aernout, and to Ernst de Sitter, grandson of Willem de Sitter's brother Ernst Karel Johan. I also wish to express my thanks to other members of the family, who provided me indirectly with useful information.

The original De Sitter Archive was stored in tens of boxes in the cellars of Leiden Observatory, waiting for over seventy years for an inventory to be made. A few times parts of this work were undertaken. De Sitter's correspondence with Einstein was traced and published. In 2008–2009, historian of science David Baneke made the complete inventory and now the archives are kept in the Leiden University Library.³ I am indebted to Baneke for his support in finding relevant data in these archives. As a general reference to Dutch astronomy in the twentieth

²Reinold de Sitter wrote *Grandfather, a charcoal sketch* (privately published, present in the De Sitter Archive at the Library of Leiden University).

³The De Sitter archives are, also digitalized, present in the Leiden University Library, Special Collections, as *Leiden Observatory Archives, directorate W. de Sitter* (Collection guide written by David Baneke, 2010).

century, Baneke's book *De Ontdekkers van de Hemel (The Discoverers of the Heavens)* gives ample information.⁴

Adriaan Blaauw (1914–2010, till his death the nestor of Dutch astronomy) provided me in a number of conversations with information, in particular concerning life at Leiden Observatory in the thirties of the twentieth century. Blaauw started his studies in astronomy after a conversation in 1932 with De Sitter, at the end of which De Sitter nodded positively to the young Blaauw, who decided then to choose for Leiden and not Amsterdam. Blaauw is the only person I know who could recollect a conversation with De Sitter (*with his sloppy jacquet over his thin shoulders*).⁵ In retrospect, I owe a lot to Blaauw.

For the analysis of De Sitter's contribution to the relativity theory, the Collected Papers of Albert Einstein,⁶ in particular the work of Michel Janssen⁷ therein, and the thesis of Stefan Röhle⁸ have been of great importance for me. Röhle's dissertation is a gold mine of personal details, relevant archives and a nearly complete bibliography.

I owe many thanks to a large number of archival workers of Dutch archives:

- De Sitter Archives in Leiden Observatory (later Leiden University Library);
- North Holland Archives⁹ (Haarlem);
- University Libraries of Groningen and Amsterdam;
- Archives of the province of Gelderland¹⁰ (Arnhem);
- Regional Archives¹¹ (Leiden);
- Museum Boerhaave (Leiden);

and of a number of archives outside The Netherlands:

- University Library of Ghent (Belgium);
- Union Internationale Astronomique (International Astronomical Union) in the Institut de France in Paris (France);
- Royal Geographical Society in London (England);
- University Library of Cambridge (England);

⁴Baneke, D., *De Ontdekkers van de Hemel, De Nederlandse Sterrenkunde in de Twintigste Eeuw (The Discoverers of the Heavens, The Dutch Astronomy in the Twentieth Century)*; Prometheus, Bert Bakker, Amsterdam, 2015.

⁵There are a few moving images of De Sitter, smoking a pipe and reading his post. They are part of an amateur film made in 1933 on the occasion of 300 years Leiden Observatory, now for restoration in the Netherlands Institute for sound and vision in Hilversum (The Netherlands).

⁶In an ongoing research process, the *Collected Papers of Albert Einstein* are being published by Princeton University Press.

⁷The results of Janssen's work on the controversies between Einstein and De Sitter concerning a number of relevant points in Einstein's cosmological ideas are included in Michel Janssen and Christoph Lehner (editors), *The Cambridge Companion to Einstein*, "No success like failure ...": Einstein's Quest for General Relativity; Cambridge University Press, 2014.

⁸Stefan Röhle wrote his thesis at the Johannes Gutenberg University in Mainz in 2007: *Willem de Sitter in Leiden—Ein Kapitel in der Rezeptionsgeschichte der Relativitätstheorien*.

⁹Dutch: Noord Hollands Archief.

¹⁰Dutch: Gelders Archief.

¹¹Dutch: Regionaal Archief.

- Huntington Library in Pasadena, Los Angeles (USA);
- Institut for Videnskabsstudier of the University of Århus (Denmark);
- Durham University in Durham (England);
- Council for Scientific and Industrial Research (CSIR) in Pretoria (South Africa).

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- Dirk van Delft, Director of Museum Boerhaave in Leiden;
- Ed van den Heuvel, Professor and Former Director of the Astronomical Institute Anton Pannekoek in Amsterdam;
- Vincent Icke, Professor of theoretical astronomy at Leiden Observatory;
- Annette Joubert of the CSIR in Pretoria (South Africa);
- Jet K. Katgert, Leiden Observatory;
- Helge Kragh, Emeritus Professor of the history of science of Århus University (Denmark);
- Johan van Kuilenburg, Dutch astronomer;
- H. van Loo, Judge at the court of justice in Arnhem;
- Jan Lub, Associate Professor of astronomy at Leiden Observatory;
- Frans van Lunteren, Professor of history of science;
- Geart van der Meer, Frisian poet and translator;
- N. Nelissen, Teacher at the City Grammar School¹² in Arnhem;
- Matteo Realdi, historian of science;
- W. Suermondt, relative of De Sitter's wife, Rotterdam;
- Lambert Swaans, Old Leiden Observatory;
- Brian Warner, Professor at the Department of Astronomy, University of Cape Town (South Africa);
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- In particular, I thank my wife Ria Koene and daughter Clasina Guichelaar, both teachers of English, for their meticulous text corrections, and my son-in-law Henk Schuitemaker for adjusting and improving a number of the photographs.

¹²Dutch: Stedelijk Gymnasium.

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Abbreviations

AG	Astronomische Gesellschaft
AH	Archives of Hertzprung, History of Science Archives, Center for Science Studies, Aarhus University, Denmark
AIP	Archives of the IAU in the Institut d’Astrophysique de Paris
AL	Archives of Lorentz in the North Holland Archives in Haarlem
AN	Astronomische Nachrichten
AOL	Annals of the Observatory in Leiden (Dutch: <i>Annalen van de Sterrewacht te Leiden</i>)
AP	Annalen der Physik
ASL	Leiden Observatory Archives, directorate W. de Sitter, in the University Library Leiden
AUL	Archives of Leiden University, in the University Library Leiden
BA	British Association for the Advancement of Science
BAN	Bulletin of the Astronomical Institutes of the Netherlands
BG	Board of Governors
CPAE	<i>Collected Papers of Albert Einstein</i> , Princeton University Press, since 1987
CPD	Cape Photographic Durchmusterung
DUL	Archives of Durham University Library
hbs	Higher Civilian School (Dutch: <i>Hogere Burgerschool</i>)
HMW	Archives of the Holland Society of Sciences, in the North Holland Archives in Haarlem. (Dutch: <i>Hollandsche Maatschappij der Wetenschappen</i>)
IAU	International Astronomical Union
IRC	International Research Council
IUGG	International Union of Geodesy and Geophysics
MNRAS	Monthly Notices of the Royal Astronomical Society
NAC	Dutch Astronomers Society

- NAW1 Archives of the (Royal) Netherlands Academy of Sciences, in the North Holland Archives in Haarlem. (Dutch: (Koninklijke) Nederlandse Akademie van Wetenschappen)
- NAW2 Reports and Proceedings of the (Royal) Netherlands Academy of Sciences, in the International Institute of Social History in Amsterdam
- PZ Physikalische Zeitschrift
- RAS Royal Astronomical Society
- RGO Archives of the Royal Greenwich Observatory in the University Library in Cambridge
- RGS Archives of the Royal Geographical Society in London