

Astrophysics and Space Science Library

Volume 399

Editorial Board

Chairman

W. B. Burton,

National Radio Astronomy Observatory, Charlottesville, VA, USA,
(bburton@nrao.edu), University of Leiden, The Netherlands
(burton@strw.leidenuniv.nl)

F. Bertola, University of Padua, Italy

C. J. Cesarsky, European Southern Observatory, Garching bei München, Germany

P. Ehrenfreund, Leiden University, The Netherlands

O. Engvold, University of Oslo, Norway

A. Heck, Strasbourg Astronomical Observatory, France

E. P. J. Van Den Heuvel, University of Amsterdam, The Netherlands

V. M. Kaspi, McGill University, Montreal, Canada

J. M. E. Kuijpers, University of Nijmegen, The Netherlands

H. Van Der Laan, University of Utrecht, The Netherlands

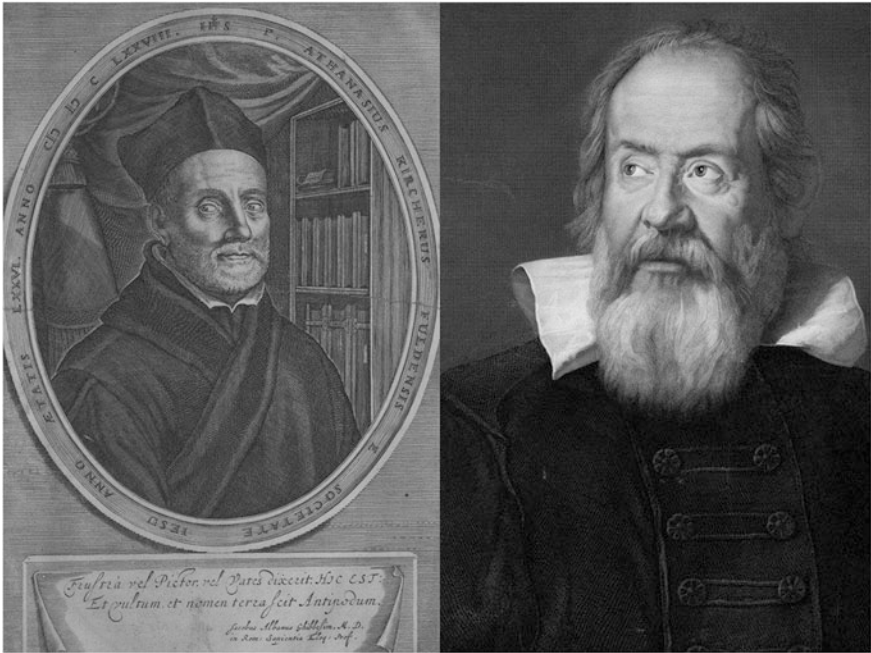
P. G. Murdin, Institute of Astronomy, Cambridge, UK

B. V. Somov, Astronomical Institute, Moscow State University, Russia

R. A. Sunyaev, Space Research Institute, Moscow, Russia

For further volumes:

<http://www.springer.com/series/5664>



Athanasius Kircher and Galileo Galilei as mature men (Kircher's portrait in G. de Sepi, 1678, *Romani Collegii Societatis Iesu Musaeum Celeberrimum*, Janson-Waesberg, Galileo's one at http://www.illaboratoriodigalileogalilei.it/galileo/iconografia/ico_ver/cronol/cronol.html)

Roberto Buonanno

The Stars of Galileo Galilei and the Universal Knowledge of Athanasius Kircher

Translation by Roberto Buonanno and Giuliana Giobbi

 Springer

Roberto Buonanno
Department of Physics
University of Rome Tor Vergata
Rome
Italy

ISSN 0067-0057 ISSN 2214-7985 (electronic)
ISBN 978-3-319-00299-6 ISBN 978-3-319-00300-9 (eBook)
DOI 10.1007/978-3-319-00300-9
Springer Cham Heidelberg New York Dordrecht London

Library of Congress Control Number: 2013956324

© Springer International Publishing Switzerland 2014

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed. Exempted from this legal reservation are brief excerpts in connection with reviews or scholarly analysis or material supplied specifically for the purpose of being entered and executed on a computer system, for exclusive use by the purchaser of the work. Duplication of this publication or parts thereof is permitted only under the provisions of the Copyright Law of the Publisher's location, in its current version, and permission for use must always be obtained from Springer. Permissions for use may be obtained through RightsLink at the Copyright Clearance Center. Violations are liable to prosecution under the respective Copyright Law. The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

While the advice and information in this book are believed to be true and accurate at the date of publication, neither the authors nor the editors nor the publisher can accept any legal responsibility for any errors or omissions that may be made. The publisher makes no warranty, express or implied, with respect to the material contained herein.

Cover illustration: "Sciatericon duodecim signorum", Museo Astronomico e Copernicano, Rome, Italy

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

Although a certain number of historical texts quoted in this book are mostly available online, I often choose to quote the original passages in the footnotes. This helps interested readers to find the meaning of the quote at once, without breaking off reading

To my early student

Contents

1	The World Theatre	1
2	Watches and Sunflowers Rotating Upon a Stationary Earth	9
3	Jesuits, Scales and Telescopes	23
4	The War of Telescopes in Rome	47
5	Lights and Shadows	61
6	Spots upon the Unchangeable Sun	77
7	The Deluge	97
8	Hieroglyphs and the Dream of Universal Wisdom	121
9	Crystal Skies and Circles of Hell	155
	Conclusion	173
	Appendix	177

Introduction

Light and shadow of the seventeenth century. This metaphor is often used as an allusion to the contradictions of a century which was responsible not only for the burnings at the stake and forced denials of astronomical observations, but also for a meaningful, enlightening art, as commissioned by princes of the Church and powerful men, who were fascinated by the beauties of the very world they ruled.

Revolutionary thought caused condemnations to the stakes, but also paved the path to the creation of a totally new idea of art. More than ever before, in the seventeenth century, the way of thinking has been at the same time clear-headed and contradictory: in a word, dramatic.

In this century, philosophers, scientists, artists, religious and powerful men realized they were at a crucial crossroads: on the one side was the reassuring subordination of new discoveries to the references in the Holy Scriptures; and on the other side, loomed a complete reversal of a comprehensive view of the world and of human life. The background was constituted of progress, astronomical discoveries, Martin Luther's theses, Reformation and Counter-Reformation, which had paved the way to Science, as well as to a renewal of philosophic thought, which the Church sought to control and rule, in vain.

Galileo, for instance, kept saying that sensible experiences alone could interpret natural phenomena. However, if you want to reduce the conflict between Galileo and the Church to opposing factions, one right and the other wrong, you would be surprised. These kinds of surprises enrich the historical scene, thus giving particular shades to the drama, inasmuch as Galileo appears as a self-confident winner, just when he is about to give in.

In the background, we can see interesting characters, such as laymen, Jesuits, missionaries, who bring experiences from another world. These are remarkable men, who tend to take into consideration all scientific discoveries, and would like to discover something themselves, in order to show the grandeur of God and of the world, as framed in a perfect, pre-established order.

They were all thrilled by a sense of wonder.

Perhaps Galileo might easily have saved himself. After all, he was a man of faith as well, but he was even more convinced that Science could not obey the authority of the Holy Writ.

The Jesuit Athanasius Kircher was also an actor on this historical stage. He was a real master of lights and shadows, as well as an indefatigable researcher, an

inventor, who loved reality and played with it, who believed in God and in Science. He was certainly not a follower of Galileo, but rather a complementary character.

Galileo and Kircher, though different from each other, if taken together, help us understand a century which paved the way to contemporary knowledge.

We know almost everything about Galileo, if we may say so about such a complex scientist and thinker. His limpid, fascinating style, his clear demonstrations, and his ability to admit he could be wrong—all these elements well introduce his character to us. A few doubts are left about why he recanted his findings, as well as about other moments of his intellectual life.

These are doubts about faith and about what kind of human, abstract, or mathematical language the Creator would use. These are the doubts of a scientist who keeps searching, thinking, teaching, and talking with other philosophers. Galileo was also a man adored by one of his daughters, and almost ignored by the other. Light and shadow.

As far as Kircher is concerned, we know many strange, curious, incredible, and fascinating details of his life. He is a priest who entered the Society of Jesus and a peculiar scientist, who is in love with everything he sees and with everything he thinks he sees. He is obsessed with collections, and enjoys his own experiments. He is an inventor who, at times, believes so much in his own judgment that he considers an experimental check useless. If you really are a genius, can you allow yourself to do this? You certainly can, if the ultimate goal is the astonishment you feel for the miraculous, unquestionable proof of God's intelligence. This was probably what Athanasius Kircher was thinking as he organized his own museum, as he let himself down in the bowels of the Earth, as he recreated, measures ready, Noah's ark.

His life was full of journeys and unremitting studies, criticism and praise, pain and hard work. And yet, he had the pleasure of showing that God had thought about everything! The world was a marvel! Where God cannot be seen, He can be imagined, by reading the Holy Scriptures. Better still, the wonders of His creation can be painted in the beautiful illustrations of Kircher's books.

The universe has its own music, as well as its own language, endowed with rules, through which we can understand and interpret an unknown language. For instance, we can decipher Egyptian hieroglyphs, and read absent signs too. Kircher's fanciful interpretation of this mysterious writing tells us a lot about this Jesuit's culture and dreams. In Kircher's view, the marvels of the world are not only an object of devotion, but also of fetishism and enthusiasm.

While, on the one hand, both scientists and inventors often showed a dangerous heedlessness and effrontery, on the other hand the Church appeared very careful, and ready to welcome new, disruptive theses only if they agreed with the Holy Scriptures.

Since theology is not a superstition, but rather a line of reasoning, complete with proofs, none of the scholars of the Collegio Romano, though stubbornly defending the principles of faith as taken from the Holy Writ, felt capable of denying the evidence of new discoveries and the cogent value of scientific

disquisitions. This mood was common to Cristoforo Clavio, who had followed the path of Galileo since his youth in Pisa, as well as to Roberto Bellarmino, a tormented inquisitor, but also a careful investigator into the results of Galileo's research.

The general attitude was certainly not obscurantism or the opposition to enquiry or reform, but rather a defense of established faith, as well as worry for the handling of novelties in front of a mass of people who—then and even now—were asking certainties from faith, while offering devotion and obedience. On the other hand, the Science which originated in that century—as well as Galileo's discoveries—were caused by doubt, by the chance of bringing all up for discussion in order to obtain a proof.

We are still far from a management of Science subject to the needs of humankind, and from a redeeming philosophy. However, at the crossroads of the seventeenth century, this path had been opened, and the Church was well aware of it.