Data Analysis Techniques for Physical Scientists

Data Analysis Techniques for Physical Scientists is a comprehensive guide to data analysis techniques for physical scientists, providing a valuable resource for advanced undergraduate and graduate students, as well as seasoned researchers. The book begins with an extensive discussion of the foundational concepts and methods of probability and statistics under both the frequentist and Bayesian interpretations of probability. It next presents basic concepts and techniques used for measurements of particle production cross sections, correlation functions, and particle identification. Much attention is devoted to notions of statistical and systematic errors, beginning with intuitive discussions and progressively introducing the more formal concepts of confidence intervals, credible range, and hypothesis testing. The book also includes an in-depth discussion of the methods used to unfold or correct data for instrumental effects associated with measurement and process noise as well as particle and event losses, before ending with a presentation of elementary Monte Carlo techniques. This title is also available as open access on Cambridge Core.

Claude A. Pruneau is a Professor of Physics at Wayne State University, from where he received the 2006 Excellence in Teaching Presidential award. He is also a member of the ALICE collaboration, and conducts an active research program in the study of the Quark Gluon Plasma produced in relativistic heavy ion collisions at the CERN Large Hadron Collider. He has worked as a Research Fellow at both Atomic Energy for Canada Limited and McGill University, and is a member of the American Physical Society, Canadian Association of Physicists and the Union of Concerned Scientists.

Published online by Cambridge University Press

Published online by Cambridge University Press

Data Analysis Techniques for Physical Scientists

CLAUDE A. PRUNEAU

Wayne State University, Michigan



Published online by Cambridge University Press



University Printing House, Cambridge CB2 8BS, United Kingdom

One Liberty Plaza, 20th Floor, New York, NY 10006, USA

477 Williamstown Road, Port Melbourne, VIC 3207, Australia

4843/24, 2nd Floor, Ansari Road, Daryaganj, Delhi - 110002, India

79 Anson Road, #06-04/06, Singapore 079906

Cambridge University Press is part of the University of Cambridge.

It furthers the University's mission by disseminating knowledge in the pursuit of education, learning and research at the highest international levels of excellence.

www.cambridge.org

Information on this title: www.cambridge.org/9781108416788

DOI: 10.1017/9781108241922

© Cambridge University Press 2017

This work is in copyright. It is subject to statutory exceptions and to the provisions of relevant licensing agreements; with the exception of the Creative Commons version the link for which is provided below, no reproduction of any part of this work may take place without the written permission of Cambridge University Press.

An online version of this work is published at doi.org/10.1017/9781108241922 under a Creative Commons Open Access licence CC-BY-NC 4.0 which permits re-use, distribution and reproduction in any medium for non-commercial purposes providing appropriate credit to the original work is given and any changes made are indicated. To view a copy of this licence, visit https://creativecommons.org/licenses/by-nc/4.0

All versions of this work may contain content reproduced under license from third parties. Permission to reproduce this third-party content must be obtained from these third-parties directly.

When citing this work, please include a reference to the DOI 10.1017/9781108241922

First published 2017

Printed in the United Kingdom by TJ International Ltd. Padstow Cornwall

A catalogue record for this publication is available from the British Library

ISBN 978-1-108-41678-8 Hardback

ISBN 978-1-009-24500-5 Paperback

Cambridge University Press has no responsibility for the persistence or accuracy of URLs for external or third-party internet websites referred to in this publication, and does not guarantee that any content on such websites is, or will remain, accurate or appropriate.

Published online by Cambridge University Press