

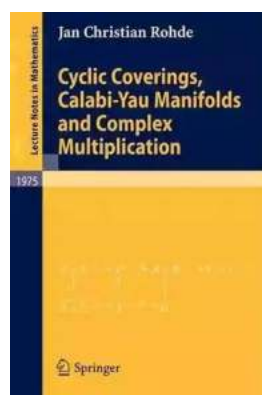
# Cyclic Coverings Calabi Yau Manifolds And Complex Multiplication Lecture Notes

Welcome to this comprehensive lecture notes on cyclic coverings Calabi-Yau manifolds and complex multiplication. In this article, we will explore the fascinating world of algebraic geometry and its applications to theoretical physics. By the end, you will have a solid understanding of these complex topics and their significance in contemporary research.

## The Beauty of Cyclic Coverings

Cyclic coverings are a crucial topic in the study of algebraic varieties. A cyclic covering of a Calabi-Yau manifold is a branched cover, which means it is an extension of the manifold achieved by adding certain "branch points." These branch points introduce singularities that are of great interest to mathematicians and physicists alike.

The study of these coverings is crucial in understanding the geometry and topology of Calabi-Yau manifolds, which play a fundamental role in various branches of mathematics and physics. Researchers study the behavior of these manifolds under different cyclic coverings to uncover new insights into their intricate structures and properties.



## Cyclic Coverings, Calabi-Yau Manifolds and Complex Multiplication (Lecture Notes in Mathematics Book 1975)

by Neki C. Modi(2009th Edition, Kindle Edition)

★★★★★ 5 out of 5

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Hardcover : 416 pages  
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Dimensions : 6.1 x 1 x 9.1 inches



## **Complex Multiplication: A Mathematical Marvel**

Complex multiplication is a captivating concept that extends the notion of multiplication from ordinary numbers to complex numbers. It is intricately related to the theory of elliptic curves, number theory, and algebraic geometry. In our lecture notes, we will delve into the depths of complex multiplication and its intricate connections with cyclic coverings of Calabi-Yau manifolds.

The study of complex multiplication opens up a vast field of research, with applications ranging from cryptography to the Langlands program. By understanding the intricate algebraic structures hidden within the nature of complex multiplication, we can gain a deeper understanding of the mathematical universe we inhabit.

## **Exploring the Lecture Notes: A Journey of Discovery**

Our lecture notes are meticulously designed to guide you through the fascinating worlds of cyclic coverings, Calabi-Yau manifolds, and complex multiplication. We will begin with an to the basics, ensuring that you have a strong foundation to build upon.

As we progress, we will cover key topics such as the Riemann-Hurwitz formula, the birational geometry of the moduli space, and the arithmetic nature of complex multiplication. Each concept will be explained in a concise and accessible

manner, ensuring that even those new to the field can grasp the fundamental ideas.

## **Why Are These Topics Important?**

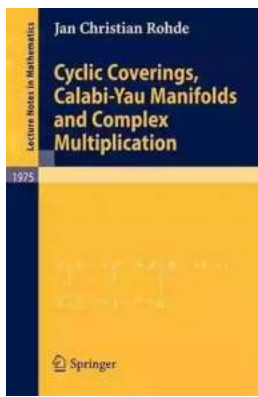
The study of cyclic coverings of Calabi-Yau manifolds and complex multiplication has far-reaching implications in modern mathematics and theoretical physics. It plays a crucial role in algebraic geometry, number theory, string theory, and mirror symmetry.

By understanding the intricate connections between these topics, we can unlock new insights into the nature of our universe. The study of Calabi-Yau manifolds has proven essential in string theory, where they provide a geometric framework for understanding the fundamental forces of nature.

Additionally, the theory of complex multiplication has applications in cryptography, with elliptic curves playing a central role in securing our digital communications. By delving into the depths of these topics, we can not only gain a deeper understanding of mathematics but also contribute to technological advancements that shape our world.

, cyclic coverings of Calabi-Yau manifolds and complex multiplication are captivating subjects that offer insights into the mysteries of algebraic geometry and theoretical physics. This article has provided a brief overview of these topics and their importance in contemporary research.

By taking the time to explore these lecture notes, you are embarking on a journey of discovery that will deepen your understanding of the mathematical universe. From the intricate structures of cyclic coverings to the marvelous nature of complex multiplication, you will gain valuable knowledge that can be applied in various fields. So, dive in and start your exploration today!



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Calabi-Yau manifolds have been an object of extensive research during the last two decades. One of the reasons is the importance of Calabi-Yau 3-manifolds in modern physics - notably string theory. An interesting class of Calabi-Yau manifolds is given by those with complex multiplication (CM). Calabi-Yau manifolds with CM are also of interest in theoretical physics, e. g. in connection with mirror symmetry and black hole attractors. It is the main aim of this book to construct families of Calabi-Yau 3-manifolds with dense sets of  $\beta$ -bers with complex multiplication. Most - amples in this book are constructed using families of curves with dense sets of  $\beta$ -bers with CM. The contents of this book can roughly be divided into two parts. The  $\beta$ -rst six chapters deal with families of curves with dense sets of CM  $\beta$ -bers and introduce the necessary theoretical background. This includes among other things several aspects of Hodge theory and Shimura varieties. Using the  $\beta$ -rst part, families of Calabi-Yau 3-manifolds with dense sets of  $\beta$ -bers with CM are constructed in the remaining  $\beta$ -ve chapters. In the appendix one  $\beta$ -nds examples of Calabi-Yau 3-manifolds with complex mul-

plication which are not necessarily members of a family with a dense set of members. The author hopes to have succeeded in writing a readable book that can also be used by non-specialists.



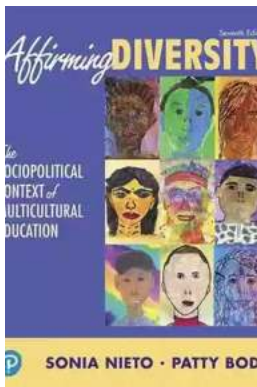
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