Schuller's Lectures on Classical Mechanics

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Preface

These are lecture notes by Apoorv Potnis of the lecture series 'Theoretische Physik 1: Mechanik' (Theoretical Physics 1: Mechanics), given by **Prof. Frederic Paul Schuller** in 2014 at the Friedrich-Alexander-Universität Erlangen-Nürnberg. Prof. Schuller discusses classical mechanics in a mathematically rigorous fashion in this course. While the original lecture series is in German, these notes are in English and have been prepared using YouTube's automatic subtitle translation tool. The video lecture series is available at https://www.youtube.com/watch?v=FNJOyxOp3Ik&list=PLPO5pgr_frzTeqa_thbltYjyw8F9ehw7v&index= and at https://www.fau.tv/clip/id/4301.

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Chapter 1

A Bird's Eye View of Physics

What is the goal of physics? According to Prof. Schuller, the only goal of physics is to predict the future, no more and no less. What is the goal of theoretical physics? Prof. Schuller remembers Wittgenstein to remark that the goal is to say all that can be said clearly. But in order to say things clearly, one needs the language of mathematics.

Chapter 2

Topological Manifolds

Chapter 3

Differentiable Manifolds

Chapter 4

Tangent Spaces

Chapter 5

Tensors and Tensor Fields

Bibliography

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[2] Valter Moretti. *Analytical Mechanics: Classical, Lagrangian and Hamiltonian Mechanics, Stability Theory, Special Relativity*. La Matematica per il 3+2. Springer Nature Switzerland AG, 2023. ISBN: 978-3-031-27611-8. Translated from Italian by Simon G. Choissi.