

“Complementi di Fisica” **Lecture 19**

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Trieste, 7-11-2012

In these lectures

- **Contents**

- Introduction to the semi-classical approximation:
 - orders of magnitude for “internal” and “external” electric fields in crystals;
 - use of “effective mass” in a classical example
- Semi-classical equations of motion for electrons in crystals (“Bloch wave-packets”)
- Effective mass of electrons
- Examples of electrons confined in energy bands and comparison with a free electron: “Bloch oscillations”

- **Reference textbooks**

- D.A. Neamen, Semiconductor Physics and Devices, McGraw-Hill, 3rd ed., 2003, p.71-78
- Ch.Kittel, Introduction to Solid State Physics, J.Wiley & Sons, 7th ed., p.203-212 (“equations of motion, effective mass”)
- W.Ibach & H.Luth, Solid-State Physics, Springer, 3rd ed., p. 231-235 (“9.1: Motion of Electrons in Bands and the Effective Mass”)



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