Advanced Quantum Mechanics

TECHNISCHE
UNIVERSITÄT
DARMSTADT

Michael Buballa

TU Darmstadt, winter term 2022/2023

Advanced Quantum Mechanics

TECHNISCHE UNIVERSITÄT DARMSTADT

- mandatory module in the new course “M.Sc. Physics”

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Welcome to all of you, new and “old” students!

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- Who of you belongs to M.Sc. Physics ?

Course information

TECHNISCHE UNIVERSITÄT DARMSTADT

- You can find (partially redundant) course related information on
  - TUCaN
  - Moodle
  - Website:
    `https://theorie.ikp.physik.tu-darmstadt.de/nhq/teaching_aqm_22-23.html`
    (see link “Online-Angebote” at TUCaN)
- On moodle and the website we will also upload lecture notes and transparencies shown during the lectures (including these ones).

Lectures

TECHNISCHE UNIVERSITÄT DARMSTADT

- Dates:
  - Mon 9:50 - 11:30
  - Thu 11:40 - 13:20, every second week, start: October 20 (this week)

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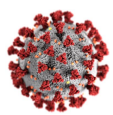
- Covid is not yet over!



[image credit: Alissa Eckert, MSMI, Dan Higgins, MAMS]

  - wear masks, keep distance (if possible), ...
  - We may have to switch to remote lectures again (I hope not, but who knows ...).

Exercises

TECHNISCHE UNIVERSITÄT DARMSTADT

- Assistant: Lennart Kurth
- Dates:
  - Group A: Tue 13:30 - 15:10 (11 participants)* Ignacio López de Arbina
  - Group B: Tue 9:50 - 11:30 (22 paricipants)* Hosein Gholami
  - Group C: Tue 13:30 - 15:10 (10 participants)* Isabella Danhoni

  * read off October 17, 8:45
  - Can we distribute this more equally?
  - Conflicts on Tuesday 13:30?
  - Would it be better to have two groups in the morning and only one in the afternoon?

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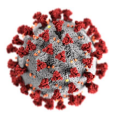

[Alissa Eckert, MSMI, Dan Higgins, MAMS]

→ Tomorrow (Oct. 18):

- Groups A+C: 13:30 - 15:10, S306/146 Ignacio López de Arbina
- Group B: 9:50 - 11:30, S207/109 Isabella Danhoni

Exercises

TECHNISCHE UNIVERSITÄT DARMSTADT

- Format:

  problems to be solved in small groups during the sessions

  \+ homework

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- Hand in the homework on paper at the beginning of the next exercise session.

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  \+ homework

- Please download the exercise sheets from moodle.
- Hand in the homework on paper at the beginning of the next exercise session.
- In exceptional cases (e.g., you are ill) you may also send your homework to your tutor by e-mail or via moodle (pdf only!).

Exams

TECHNISCHE UNIVERSITÄT DARMSTADT

- Official module descriptions (M.Sc. Physics and M.Sc. Physik):

  oral examination 30 min, from 25 participants a written examination of 120 min can be given. The form of examination will be announced in the first two weeks of the course.

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- Dates of the written exams (no guarantee, check on TUCaN):
  - February 22, 2023, 10:00 - 12:00
  - March 22, 2023, 9:00 - 11:00

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- Bonus rule:
  Upgrade of the mark by one degree (e.g., 2,7 $\rightarrow$ 2,3) if 50% or more of the homework scores are achieved (not possible for failed exams).

Contents

TECHNISCHE UNIVERSITÄT DARMSTADT

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  - Scattering theory
  - Many-particle theory, “second quantization”
  - Relativistic quantum mechanics

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- Topics will be combined in relativistic quantum field theory

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Nobel Prize 2022

TECHNISCHE UNIVERSITÄT DARMSTADT

KUNGL. VETENSKAPS-AKADEMIEN
THE ROYAL SWEDISH ACADEMY OF SCIENCES

4 October 2022

The Royal Swedish Academy of Sciences has decided to award the Nobel Prize in Physics 2022 to

Alain Aspect
Institut d'Optique Graduate School – Université Paris-Saclay and École Polytechnique, Palaiseau, France

John F. Clauser
J.F. Clauser & Assoc., Walnut Creek, CA, USA

Anton Zeilinger
University of Vienna, Austria

"for experiments with entangled photons, establishing the violation of Bell inequalities and pioneering quantum information science"

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