

Lecture for BSc and MSc:

Hydrodynamik

Winter semester 2020/21

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Dates and structure

- **Time: Fridays 9.15 - 11.00, Start: Fr 06. November 2020**
- **Lecture @ gHS, ITP, Philosophenweg 12, for up to 30 participants BSc and MSc.**
In November, online only (address see below).
Please inscribe only if you actually will attend the full semester, and plan to take part in the written test at the end of this term. (If you are inscribed and want to step back, please send an email to wolschin@uni-hd.de. The restriction is due to corona.)
- **The lecture will be streamed online for all interested students at the above time:**
Meeting ID: 810-475-9006
Passwort: 016090
Link: <https://zoom.us/j/8104759006?pwd=VDFQQ2hFU3FBTGNOZ2J2SUp6R1Uydz09>
- **Participation in the final test in February only for registered participants.**
There is a waiting list in case somebody steps back during the term.
- **Prerequisites: Lectures on Quantum Mechanics, and if possible Statistical Physics (MKTP1).**
- **Language is german, questions (in the chat or live) can be asked in english.**
- **Exercises will be given as homework problems.**
- **4 ECTS-Credit points for registered students who pass the final written test in February 2021.**

Topics II

5. Grenzschichten

- Laminare Grenzschicht
- Turbulente Grenzschicht

6. Wärmeleitung

- Die Wärmetransportgleichung
- Wärmetransport in inkompressiblen Medien
- Wärmetransport in unbegrenzten Medien
- Konvektion

7. Diffusion

- Diffusion in Flüssigkeits-Gemischen
- Brownsche Bewegung
- Diffusion in relativistischen Systemen: Schwerionenreaktionen

Topics III

8. Relativistische Hydrodynamik

9. Astrophysikalische Hydrodynamik

10. Hydrodynamik der Superflüssigkeiten

- Grundlagen
- Hydrodynamische Gleichungen für HeII
- Schallausbreitung in Superfluiden

**Vorlesung Freitags 9.15 - 11.00 Philosophenweg 12 gHS ab 06.11.2020 fuer bis
Zu 30 TeilnehmerInnen, sowie ggf. online via zoom.**

Schein mit 4 ECTS-Punkten nach Klausur am Ende der VL

Preliminary script see <https://link.springer.com/book/10.1007/978-3-662-48024-3>

Literatur

- D.J.Tritton: Physical Fluid Dynamics, Oxford University Press(1977)
- L.D.Landau, E.M.Lifschitz: TPVI- Hydrodynamik (1991)
- D.J.Acheson: Elementary fluid dynamics, Clarendon (1990)
- T.E.Faber: Fluid dynamics for physicists, CUP (1995)
- G. Wolschin: Diffusion and local deconfinement in relativistic systems, Phys. Rev. C 69, 024906 (2004)
- W.Greiner,H.Stock: TP2A-Hydrodynamik, H.Deutsch (1987)
- C.Godreche (ed.): Hydrodynamics and nonlinear instabilities, CUP (1998)
- A.Sommerfeld: TPII, Mechanik der deformierbaren Medien (1947)
- A.R.Choudhuri: The Physics of Fluids and Plasmas (1998)
- R.Lüst: Hydrodynamik (1978)
- H.L.Swinney (ed): Hydrodynamic Instabilities and the Transition to turbulence
- S.N.Shore: An introduction to astrophysical Hydrodynamics (1992)
- D. Michalas: Stellar Atmospheres, Freeman
- F.H.Shu: The physics of astrophysics, Vol.II, Univ. Science books