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TRADITIO ET EXCELLENTIA

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Name and surname of the PhD advisor: Tiușan Coriolan Viorel

Theme: Multiscale modelling of magnetic and transport phenomena and properties in solid state heterostructures and spintronic devices

Nr. of doctoral positions: 1

Doctorate funding type: fee in foreign currency, non-EU citizens

Members of the admission committee:

1. Prof. dr. Tiușan Viorel Coriolan -President, PhD advisor
2. Prof. dr. Andreica Daniel
3. Sen. Res. dr. Zirbo Liviu

Exam topic:

1. Models in solid state Physics: free electrons, Bloch electrons in periodic potential, Tight-Binding.
2. Comparison of tight binding and nearly free electron bandstructure.
3. Transport of heat and electricity in metals and semiconductors.
4. Magnetoresistance and spintronics main concepts: GMR, TMR, applications in classic, neuromorphic and quantum technologies.
5. Classes of Hall effects: ordinary, anomalous, topological, spin-Hall effects and their quantum analogues.

Interview topic:

1. Models and approximations in Solid State Physics and solid-state devices: electronic transport, magnetic properties.
2. Spintronics: basic concepts and applications.

Bibliography:

1. Kittel C., Introduction to solid State Physics, seventh edition, John Wiley & Sons, New York, (1996).
2. Evgeny Y. Tsymbal, Igor Žutić, Spintronics Handbook, Second Edition: Spin Transport and Magnetism, ISBN 9780367777876, Published March 31, 2021 by CRC Press.
3. J. Singleton, Band Theory and Electronic Properties of Solids (Oxford Master Series in Physics), Publisher, Oxford University Press, 2001; ISBN, 0198506457, 9780198506454.
4. J. M. D. Coey, Magnetism and Magnetic Materials, Cambridge University Press; Online publication date: June 2012; Print publication year: 2010; Online ISBN 9780511845000, https://doi.org/10.1017/CBO97805118450003.

Date, time and place of the exam: 14.09.2023, 9.00 o'clock, room 235, Faculty of Physics, Babes-Bolyai University, Cluj-Napoca, Romania