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| Code of course: BMA-LOTD-615, BMI-LOTD-615E, BMA-FILD-392 |
| Title of course: **Quantum contextuality** |
| Title of course (in Hungarian): **Kvantumkontextualitás** |
| Lecturer: **Gábor Hofer-Szabó** |
| **General aim of the course**:  During the course, we will analyze the concept of contextuality in quantum theory and will overview the main no-go results in quantum theory. Although the course is self-contained; it presupposes some basic knowledge of mathematics (not of quantum theory!) and requires substantial work during the semester.  **Content of the course:**   1. The formalism of quantum theory 2. What is quantum probability? 3. The von Neumann and the Jauch-Piron theorem 4. The EPR argument 5. Kochen-Specker arguments 6. Pitowky's formalism 7. Ψ-ontic and Ψ-epistemic ontological models 8. What is contextuality? 9. The PBR theorem 10. Contextuality and locality 11. What is a local physical theory? 12. Bell's inequalities 13. The GHZ theorem   **Grading criteria, specific requirements:**  (1) Active participation in the course, 2) short weekly assignments, 3) oral exam.  **Suggested reading:**   M. Dickson: "Non-relativistic Quantum Mechanics," in J. Butterfield and J. Earman (eds.): *Philosophy of Physics*,  Elsevier, 2007.   R. I. G. Hughes: *The Structure and Interpretation of Quantum Mechanics*, Cambridge: Harward University Press, 1989.   J. M. Jauch: *Foundations of Quantum Mechanics*, Massachussetts: Addison-Wesley Publishing Company, 1968.   T. Maudlin: *Philosophy of Physics: Quantum theory,* Princeton University Press, 2019.   de Muynck, W. M., *Foundations of Quantum Physics, an Empiricist Approach,* Kluwer, 2002.   M. Readhead: *Incompleteness, Nonlocality, and Realism*, Oxford: Clarendon Press, 1987.   L. Ruetsche: *Interpreting Quantum Theories*, Oxford: Clarendon Press, 2011. |