

Introduction to the theory of Loop Quantum Gravity - NTMF080

Questions for the exam:

1. What is the Holst term and where it appears?
2. What are Ashtekar-Barbero variables and how they are related to description of geometry?
3. What is parallel propagator, how we obtain it and what are its properties with respect to operations on paths (composition, etc.)?
4. What is the loop representation of connections and what are the benefits of using it?
5. Illustrate the main points of reconstruction of connection out of holonomies (loop representation).
6. How was the scalar product on cylindrical functions introduced and what are its properties?
7. What are spin networks and spin network states? How they are related to loop states?
8. How do spin network states help with gauge and diffeomorphism constraints?
9. Which operators can be introduced in the context of spin network states and do they have some geometrical interpretation?
10. What kind of variables arise when using Ashtekar-Barbero variables of LQG in the reduced setting of spatially flat FLRW model (LQC)?
11. Which basis of states and what operators are used for analysis in LQC for spatially flat FLRW model?