2018 Physics Study

QFT & GR

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Plan

1. Text Book

1) Candidates

Subject	Book Title	Author	Status
QFT	**Path Integrals in Field Theory**	**Ulrich Mosel**	Undetermined
QFT	**Introduction to Gauge Field Theory**	**Bailin & Love**	Undetermined
GR	**Relativity on Curved Manifolds**	**Felice & Clarke**	Selected

2) Pros & Cons of QFT Book

Mosel

1. Easy & precise notation
2. Great motivation to use path integral
3. Lack of advanced contents (like SSB)
4. More Resonable

Bailin & Love

1. No hard mathematics but still great
2. Have many advanced contents (even GUT)
3. Difficult notation and omit some explanations
4. More focusing on physics

3) Suggestions

- Start path integral with **Mosel**'s book
- If we finish **Mosel**, then discuss with **Bailin & Love**
- Yeji lecture **Mosel** / Friday
- TG lecture **Felice & Clarke** / Sunday

2. Specific Plan

1) Mosel

Part	Contents	Date
NRQM	1. The Path Integral in Quantum Theory	2018.08.17
NRQM	2. Perturbation Theory	2018.08.17
NRQM	3. Generating Functionals	2018.08.17
RQFT	4. Relativistic Field Theory	2018.08.24
RQFT	5. Path Integrals for Scalar Fields	2018.08.31
RQFT	6. Evaluation of Path Integrals	2018.08.31
RQFT	7. Transistion Rates and Green's Functions	2018.09.07
RQFT	8. Green's Functions	2018.09.07
RQFT	9. Perturbative ϕ^4 Theory	2018.09.14
RQFT	10. Green's Functions for Fermions	2018.09.21
RQFT	11. Interacting Fields	2018.09.21
GFT	12. Path Integrals for QED	2018.10.05
GFT	13. Path Integrals for Gauge Fields	2018.10.05
GFT	14. Examples for Gauge Field Theories	Undetermined

2) Felice & Clarke

Section	Subsection	Date
1. The Background Manifold Structure	**All Review**	2018.08.12
2. Differentiation	Tensor fields and congruences	2018.08.19
2. Differentiation	The Lie Derivative	2018.08.19
2. Differentiation	The connector	2018.08.19
2. Differentiation	Parallel propagation and geodesics	2018.08.19
2. Differentiation	Transformation properties of the connector	2018.08.26
2. Differentiation	The covariant derivative	2018.08.26
2. Differentiation	Torsion and normal coordinates	2018.08.26
2. Differentiation	Compatibility of the metric with the connection	2018.08.26
2. Differentiation	Parallelism	2018.08.26
2. Differentiation	Applications of the covariant derivative	2018.08.26
2. Differentiation	The exterior derivative	2018.09.02
2. Differentiation	Frobenius Theorems	2018.09.02
2. Differentiation	Isometries on M	2018.09.02
3. The Curvature	The Riemann Tensor	2018.09.09
3. The Curvature	Symmetry properties of the Riemann tensor and the Gaussian curvature	2018.09.09
3. The Curvature	Significance of a curvature tensor vanishing everywhere	2018.09.09
3. The Curvature	The Ricci tensor, the curvature scalar, the Wely tensor	2018.09.16
3. The Curvature	The Bianchi identities	2018.09.16
3. The Curvature	The equation of geodesic deviation	2018.09.16
3. The Curvature	**All Review**	2018.09.30
3. The Curvature	The covariant derivative of the world function	2018.10.07

Section	Subsection	Date
3. The Curvature	Maximally symmetric spaces	2018.10.07
1,2,3 Review	**All Review & prepare midterm**	2018.10.14
4. Space-Time and Tetrad Formalism	The space-time manifold and the physical observer	2018.10.21
4. Space-Time and Tetrad Formalism	Contructions of a tetrad	2018.10.21
4. Space-Time and Tetrad Formalism	Relations among tetrads and the Lorentz group	2018.10.21
4. Space-Time and Tetrad Formalism	The propation laws for tetrads	2018.10.28
4. Space-Time and Tetrad Formalism	The Ricci rotation coefficients	2018.10.28
4. Space-Time and Tetrad Formalism	Differential operators related to a tetrad frame	2018.10.28