Exercises

Suggestions for subjects for exercises.

1. First of all, helping to improve the Lecture Notes is valued as exercises. This includes

   - simply finding typos, and trading in a corresponding list
   - pointing out misleading descriptions or formulas which are incorrect or merely not easy to understand.
   - suggestions for changes in proofs, definitions, assertions etc.
   - suggestions for amendments - smaller or bigger. Possibly with texts which present the amendment, or at least sketches.
   - suggestions for general structure of Lecture Notes
   - suggestions: what should be included, what should be removed

2. To obtain ideas which subjects are good for an exercise article on can search in (the pdf document of) the Lecture Notes with the term "exerc". There are several footnots or remarks in the Lecture Notes leading to exercises.

3. To obtain further ideas it is perhaps reasonable to look at proofs (in the Lecture Notes): In general improvements are possible, either the proof can be corrected, or it can be made clearer, or an alternative proof can be found, or a more general statement can be proven.

4. Moreover, a general type of exercise is: Elaborate concrete physical models as examples in detail. Either classical mechanics models or quantization of classical mechanics models. For instance, rigid body various tops, spin, ...

5. Similar to the preceding point: Describe concrete classical models and reduction explicitly. Afterwards: the corresponding quantum models.

6. Another general type of problems can be detected by filling gaps in the arguments: Several remarks, observations, assertions, examples, lemmata are not proven, or only a hint is given. A detailed proof would be welcome, also of perhaps more general statements.

7. Same for proofs of propositions, for instance

   - equivalent condition on ω being non-degenerate (1.22 in the current numbering)
   - on a paracompact manifold: a complex line bundle always has a hermitian structure.

8. More difficult in general: A number of proofs of important statements are not provided. For instance

   - Darboux's theorem

- 5.11 on parallel transport
- 5.12 on constructing connection out for parallel transport. Perhaps one has ti add a property.
- General existence of an open cover of a manifold with contractible intersections
- Weil's theorem on integrality
- Frobenius

Organisation:

1. Contributions can be delivered in any (electronic) format by mailing to `martin@schottenloher.de`

2. no problem if several people treat the same exercises,

3. of course, you can work together and contribute a joint paper.