Project: Gala Trick

For the course project you'll read and work though some material related to quantum mechanics and write it up for your peers. I called this a "Gala Trick" since the thing I have in mind is a slightly expanded version of a party trick. I'm looking for the equivalent of 2-3 homework problems of "working stuff out" perhaps preceded or intertwined with about a page of background information. So the idea is to do something similar to a party trick where you generate a self-contained derivation or development of something cool, but you'll need a little more space to develop the background before you do it, since your audience (your peers) may not be as familiar with your setup as is the case when a party trick is a part of the main development of a course. The idea is to perhaps read a source or several sources and translate some part of it such that it can be readily understood by your peers. This is similar to what you did in some of the homework party tricks and what I do with some of my in-class work sheets, but yours will be wrapped in some additional background.

Your audience is your peers, literally. After the projects are submitted, you'll be assigned two of these projects to read and review. To see how you'll be evaluated, check out the peer feedback form here: https://forms.gle/GYcQVEqjjdKQDYSY7
In addition to providing me and each other with feedback about the projects, the review process will give you a chance to benefit from the work of some of your peers – you'll get to learn something!

I'll ultimately assign the grades, but my assessment will be informed by the reviews I get from your peers. In the publishing world, I'd be sort of analogous to the editor.

What should you learn and write up? Well, something that interests you that's related to quantum mechanics that lends itself well to writing a page or a few pages of introduction/background/overview, then calculating something.

Here are some examples:
- We are not going to do chapter 8 of Townsend about the path integral approach to QM. You could learn a little about it and work though a sample application.
- The text by Mark Beck on our reserve shelf does much of what we've done by focusing on spin ½ particles using photon states instead. You might be able to work through something cool here. For example, Section 8.4 investigates tests of Local Realism with photons.
- The K-meson system is another nifty 2-state system. Section 11-5 of Feynman works out cool stuff about this system. In fact, chapters 10 and 11 of Feynman do this for a number of 2-state systems.
- Read something that we read from Townsend from another source. For example, maybe read the ammonia maser from Feynman. I bet you'll find an example and/or derivation that's different from what's in Townsend that's interesting to present.

The possibilities are endless but:
- Keep it pretty narrow. The idea is to actually calculate something, not present a shallow overview.
- Remember that your peers are your audience. The idea is to make the topic accessible to them. You can't assume they have learned material that is not a part of this class or it's prereqs.
- Don't copy from your source. First, that's plagiarism. Second, the idea is to develop your own understanding and then adapt the level, notation, etc to make the treatment easily accessible to your peers.

You could latex all of this, or you could use a mix of typed and hand-written notes.