

## Study plan

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### Ferromagnetism in Color Superconductivity

Quantum Chromodynamics (QCD) is believed to be the fundamental theory of quarks and gluons. Our ultimate goal is to understand all strong interaction phenomena. QCD predicts that quarks and gluons have a lot of states under low temperatures and moderate densities. It also predicts the possibility the existence of a quark star which is constituted only by quarks and gluons. A quark star is really exotic object since if they are observed, it would tell us a lot about quarks and gluons. Thus, there are two possibilities to observe the properties of quarks and gluons, accelerator experiments and quark stars.

In our work, we will study the magnetic property of color super conductivity which is the color version of super conductivity in electromagnetism. If color super conductivity state is magnetized, we will be able to observe it. Especially, if a color super conductivity quark star is magnetized, we can observe it because magnetic fields are long-range in this case. So this is an extremely fascinating investigation.

To study whether the magnetization occurs, we will evaluate effective potential. Effective potential is an essential quantity, it has the information about what kind of state is realized. Once effective potential calculated, we can realize the state of substances and of course, we will know about magnetization.

Though we have realized that this subject is really important, this kind of work has not been done enough. It was just because there are technical difficulties in calculating various quantities. However due to the possibility to observe quark stars and experimental technology improvements, it became much more important these days.