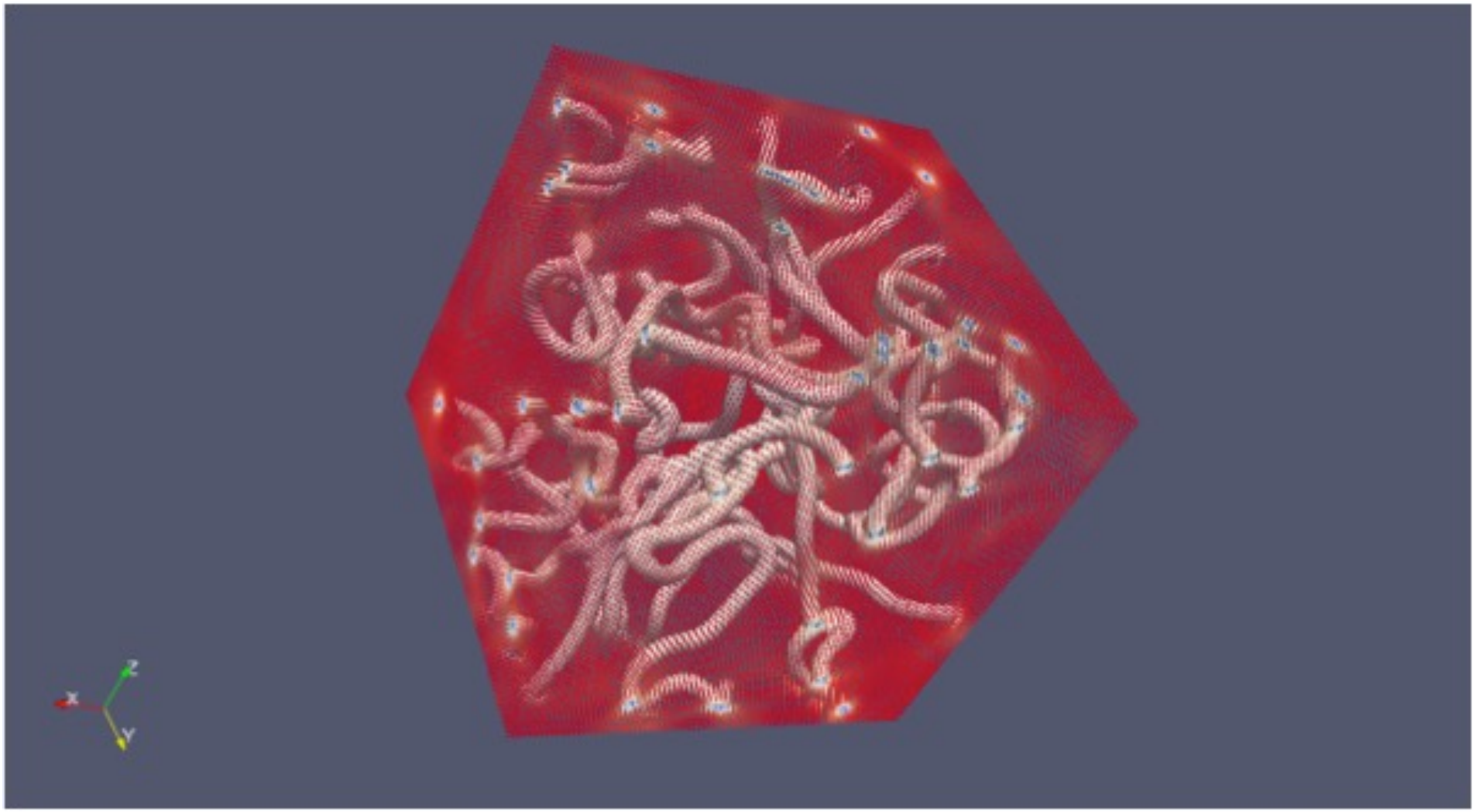
Advanced Computational Methods in Condensed Matter Physics



PHYS 790A – Special Topics in Physics - Condensed Matter Physics

Information

- **lecture:**

Tuesdays, 17:00-19:00 on zoom
(no lectures: spring break: March 10th, 17th [APS])

- **Homework & exam:**

- common project to be presented February 24th
- Individual midterm task: week of March 23rd
- final, individual project to be presented April 28th

- **webpage:**

http://www.aglatz.net/home/teaching/compphys_S2026/

- **office hours:**

Tuesdays & Thursdays, 12:15-13:15, or by appointment, La Tourette Hall 217

Grading

Final grade:

20%: lecture attendance percentage

20%: 1st project

20%: midterm task

40%: final project

➔ total score between 0 and 1

→ multiplied by 12

→ rounded to the closed integer

→ divided by 3, and finally graded according to →

A = 4.00
A- = 3.67
B+ = 3.33
B = 3.00
B- = 2.67
C+ = 2.33
C = 2.00
D = 1.00
F = 0.00

Aim & format

The lecture should

- provide an overview of some advanced methods in computational condensed matter physics

→ ***The main aim is to serve as a base for possible future computational research projects.***

Format of the lecture:

- The first 3 weeks are introductory to basic concepts in computational physics
- The following chapters cover some advanced computational methods, including DFT (using quantum espresso), GPU computing (time-dependent PDEs - complex Ginzburg-Landau and micromagnetic simulations [using mumax], MD), Examples of ML/AI and quantum computing, quantum Monte-Carlo, and maybe DMRG.
- Projects involve writing & running codes plus data analysis and presentation.
- Again, attendance is essential, in particular the hands-on practice lectures in order to get started with the homework.