



The 2024 Boulder Summer School for Condensed Matter Physics
took place between July 1-26.

59 students came from **11 countries** to learn from **21 lecturers**
about the latest research in

“Self-Organizing Matter: From Inanimate to the Animate.”

For our final activity, we asked students to break into six groups of ten
to come up with four **key-takeaways** in the form of tweets.

Here are their **insights** 💡



Group 1

1. Science thrives on collaboration, networking and building a strong research community. Let's grow together.

[#network](#) [#collaboration](#) [#united by physics](#)

2. Failures are part of our academic journey, yet we often hide them. A 'CV of failures' shows the real struggle behind the successes—rejections, missed opportunities, and hard lessons.

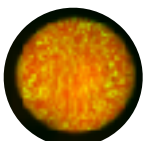
[#FailureCV](#) [#AcademicStruggles](#)

3. Never underestimate the power of simple experiments! Keep it simple, keep it insightful!

[#ScienceSimplicity](#) [#Theory](#)

4. Like physicist, physical matter learns through stressing constraints

[#learning](#) [#BSS2024](#) [#physics](#) [#StressedOut](#)



Group 2

1. Few + few = few Few × few = 10

[#pheW](#)

2. Don't be afraid to reach your chemical potential!

[#mu_got_this](#)

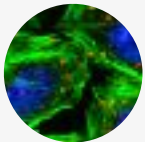
3. You are my T1, you make my heart melt

[#the_vertex_model_is_real](#)

4. I'm just a spring minding my own nodes and yet I can learn anything you want me to

[#learningspringnetworks](#)





Group 3

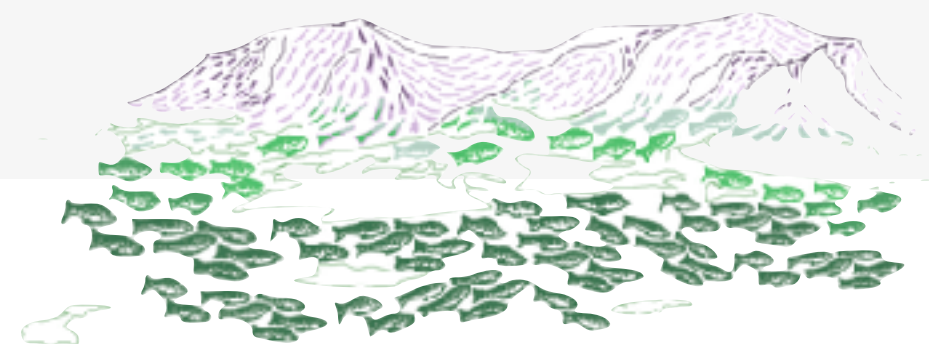
🎯 Over-parameterization. Counting the numbers of constraints (N_c) and degrees of freedom (N_d) in a system is highly informative (especially in the case where a function is being optimized, e.g. energy minimization).

⚖ Behavior near and far from equilibrium. By minimizing free energy under the condition of chemical equilibrium, one can learn a lot about the properties of polymer/monomer systems at or near equilibrium.

🧱 Material properties. The stress strain relationship is determined by material properties and carries information about a material's symmetries

❌🔄 Nonreciprocity. Non-reciprocal interactions are natural and occur across a wide range of systems leading to dynamical phase transitions.

🔬💡 Every model is wrong, but some are (really really) useful.



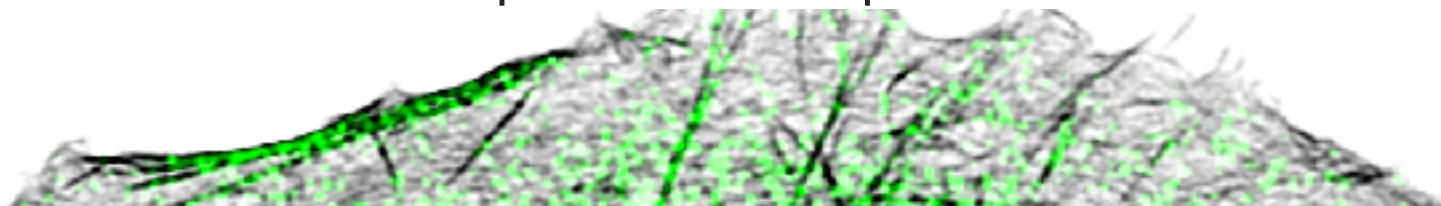
Group 4

More is different, and sometimes many more is different from more.

Different types of microscopic molecular motors will give you different types of active stresses.

Mean field is often enough for biology.

Membrane spontaneous curvature depends on the protein surface fractions and insertion depth.





Group 5

1. Non-reciprocity is the spice of life.

[#interactions](#) [#oddelasticity](#)

2. Phase separation can happen in systems with different microscopics.

[#cahnhilliard](#) [#MIPS](#)

3. When in doubt, equate chemical potentials.

[#equilibrium](#)

4. Don't be intimidated by bio jargon because if you push through, there's cool physics behind it!

[#actomyosin](#) [#cytoskeleton](#)

5. (bonus) It's not the physics you learned, but the friends you made along the way.

[#BSS2024](#)



Group 6

1. A few squared equals ten.

2. Be careful, all the faces can show phase separation.

3. More is not always better (aka C4C).

4. Biological functionality emerges at the overparameterized regime.



FARRAND FIELD

Till Next Time!

