

# Houssem Kihal,

## Computational Physics, Statistical Physics

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📍 Paris Area, France

I just finished my master's degree at Cergy-Paris University studying Computational Physics and modeling.

I'm interested in the multidisciplinary field of statistical physics applied to modeling biology. More specifically, I have been interested in Active matter. I just finished a 6-month master's internship at [LPTM](#) lab in active matter theory.

My internship focuses on computational models for active matter in 3D, supervised by Prof. [Peruani Fernando](#) we study the emergence of collective motion and analyze the statistical properties.

## INTERN

**Computational models for Active Matter in 3D** 6-month – , LPTM lab, Cergy-Paris, France 2021

My master's internship at [LPTM](#) with Prof. [Peruani Fernando](#), we are studying an active matter model [Large-scales patterns in a minimal cognitive flocking model](#) in three dimensions , the goals of the internship are:

- Develop a c++ code to run on the cluster, using molecular dynamics simulation technique to optimize the code and simulate the active matter model.
- we set up a systematic method to analyze the model using order parameters, and generate phase diagram.
- we Investigated the role of dimensionality.

Skill to acquire : learn about stochastic processes - Langevin equations - molecular dynamics simulations - active matter - c++.

## Projects

**Reproduce Active matter Model - [link](#)** 4 Weeks – Cergy-Paris, France 2021

- Re-create simulation of the article [Large-scales patterns in a minimal cognitive flocking model](#), with  $N = 10^4$  active particles using Julia programming language.
- Analyze the emergent behavior of the system when changing control parameters.

**Simulating the Vicsek Model in 3D** 8 Weeks – Cergy-Paris, France 2021

- Reproduce Vicsek Model simulation in 3D using Python.
- Visualize this simulation using Blender.

**Classifying flocking behavior using-AI** 4 Weeks – Cergy-Paris, France 2021

- Design and implement state of the art machine learning algorithm to classify flocking behavior using Deep Neural Network and CNN, with pytorch.

**Biological Oscillators - [link](#)** 4 Weeks – Cergy-Paris, France 2020

- Give a comprehensive review of how we can apply Systems Biology to model biological oscillators (Biological network, a system of partial differential equation, study the dynamics).
- Rebuilt a simple biological oscillator using a biological network and then investigate the dynamics, implemented using Python.

**Quantum Random Walk - [link](#)** 3 Weeks – Cergy-Paris, France 2020

- Presented a complete review of how we can model discrete quantum walks 1-dimensional lattice.
- Implement Quantum random Walks on a cycle of 8 nodes using IBM-Q simulator Qiskit.

## Education

**Master in Physics and Modelling**, CERGY-PARIS UNIVERSITY, Paris 2019 - 2021  
**Bachelor in fundamental Physics**, FARHAT ABBES UNIVERSITYS, Setif, Algeria 2014 - 2017

## Skills

- **Python** : NumPy- pytorch - Qiskit - Pandas - Matplotlib - SymPy
- **C/C++** : c- c++11- OpenMP- std
- **julia** • **Matlab** • **Mathematica** • **Linux** • **LaTeX**
- **Version Control** : git - GitHub
- **Computer Graphics** : Blender - Adobe(Ae,Pr,Au,Ps,Ai) - Cinema4D

## Conference Presentations

**Mobility, self-organization and swimming strategies** Nice and Fréjus 18 - 29 Oct 2021

## Courseworks

Statistical Physics, Phase Transitions, Dynamical Systems, Computational Physics, Quantum Mechanics, Quantum Information, Adv Classical Mechanics.

## Languages

**English**: Full professional proficiency

**French**: Full professional proficiency

**Arabic**: Native proficiency

## Personal interests

Science, Technology, Traveling, Photography, Languages, Communication, Food, Movies, Music.