

# Turbulence Project 2025

## Turbulence at finite Reynolds number and the skeleton of chaos

Tobias M. Schneider

Omid Ashtari

Savyaraj Deshmukh

Jean-Clement Ringenbach

# Discussion points

- Intro: The topic of the project
- Logistics & rules
- The purpose of a research-type project
- Tipps and how to get help

# Statistics of Turbulence



Warhaft Wind and Turbulence Tunnel,  
Cornell



Active Grid

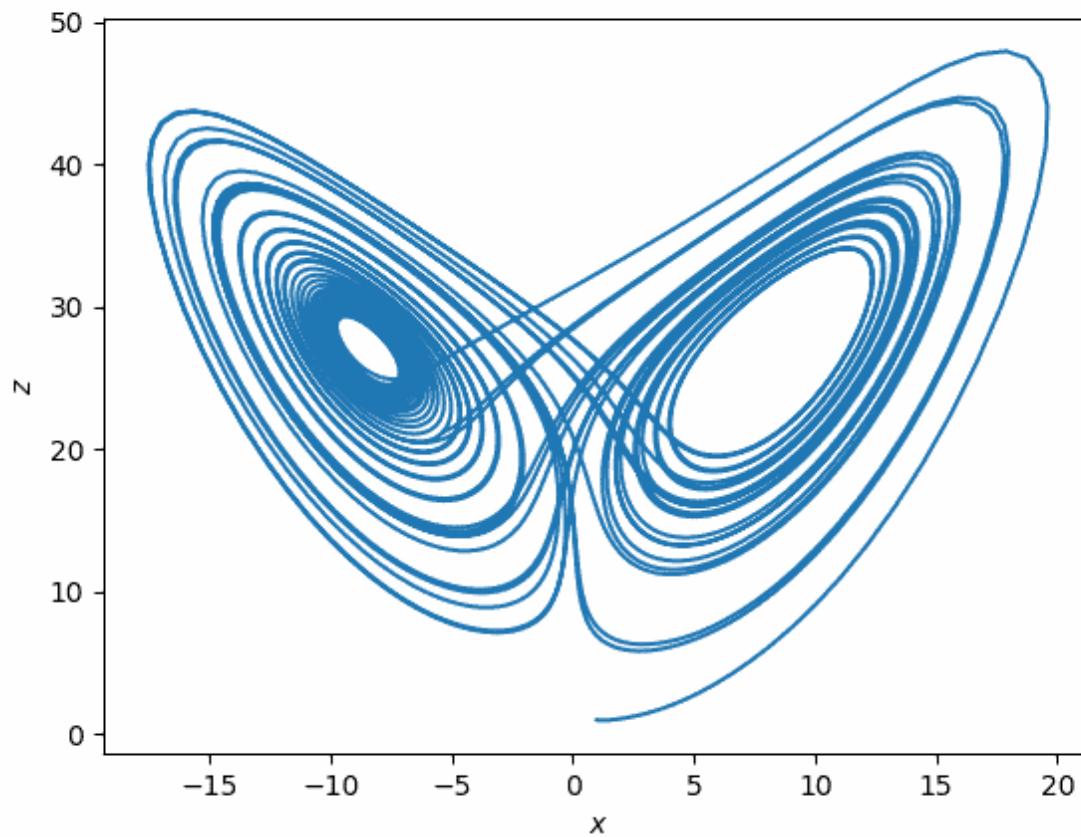


Prof. G. Bewley



The team

# Deterministic Chaos and how it emerges



# Dynamical Systems and Chaos... one possible path towards a first-principle based description of turbulence

Turbulence - *,the most important unsolved problem of classical physics'* (Feynman)

Equations for (incompressible) turbulence  
(Navier 1823)

$$\rho \left( \frac{\partial \mathbf{v}}{\partial t} + \mathbf{v} \cdot \nabla \mathbf{v} \right) = -\nabla p + \mu \nabla^2 \mathbf{v} + \mathbf{f}.$$
$$\nabla \cdot \mathbf{v} = 0.$$

“Equation of life” (?) (Feynman 1964)  
Schrödinger equation

$$i\hbar \frac{\partial}{\partial t} \Psi = \hat{H} \Psi$$

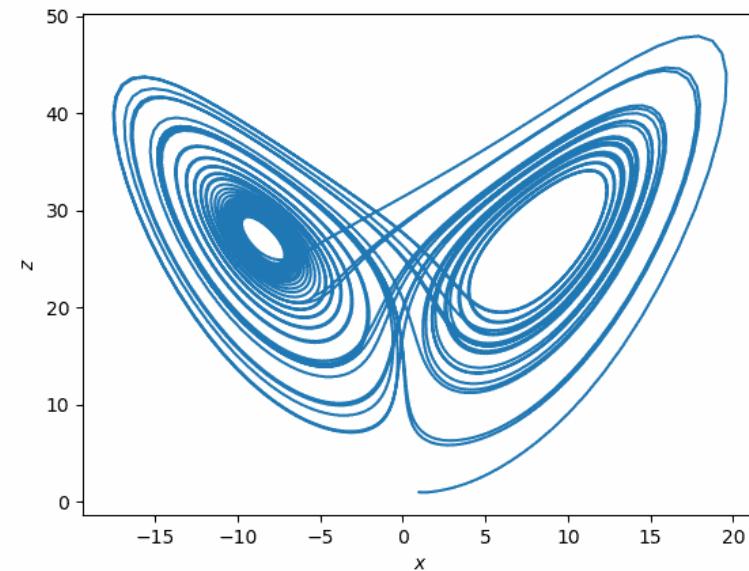
Question: Where is biology / turbulence in these equations?

# Turbulent statistics and the onset of chaos

Part I – statistics of turbulence



Part II – emerging chaos



Logistics, rules, details -> instruction sheet!

