Coddex: simulating crystals

- Simulation for crystal plasticity
- PDI/Damaris equipped for interface with external libraries
- GPUs are not used by the code so possibility to use them in-situ

Dyablo: astrophysics simulation

- Multi-physics simulation
- Improvement over RAMSES, in particular with AMR
- Young code

AI use-cases

Dyablo: no clear use-cases for now.

- **Event detection**:
  - *Coddex*: mostly based on physics models
  - These models could be used in ML algo?

- **Anomaly detection**:
  - *Coddex*: clear need for anomaly detection, in particular “non-physical” fields
  - Need to find annotations to be able to validate the models

- **Simulation-based inference**:
  - *Coddex*: very interested by such application (Targeting SBI sprint jan.)
  - Interest in learning from smaller scale simulations and generalize on larger ones

A common issue: input of AI systems

- **Coddex** - regular grid data (tensors)
- **Dyablo** - AMR (Oct-tree which is refined as the simulation goes)
  - A postdoc is working on developing a data format for easy

⇒ Finding efficient ways to input data to AI-models would be interesting

- Convolutional layers are an option
- Discussions on sampling-based representations, which are independent of the data format (provided one can sample efficiently)