Simulation Setup for Planck-Scale Scalar Field Theory

1 Environment Requirements

Simulations require a Linux/macOS/Windows system with:

- CPU: 8 cores (e.g., Intel i7 or AMD Ryzen)
- RAM: 16 GB
- Storage: 10 GB for data outputs
- Python 3.8+

2 Dependencies

Install dependencies using:

```
pip install -r SimulationCodes/requirements.txt
```

Contents of `requirements.txt`:

- numpy==1.24
- scipy==1.14.1
- cython==0.29.36

3 Compilation

3.1 Linux/macOS

Compile Cython modules:

```
cythonize -i SimulationCodes/common/lattice_cy.pyx
```

3.2 Windows

Install Microsoft Visual C++ Build Tools (available at `https://visualstudio.microsoft.com/visual-cpp-build-tools/`). Then compile:

```
cythonize -i SimulationCodes/common/lattice_cy.pyx
```

4 Data Storage

Simulation outputs are saved in:

- `SimulationCodes/paper1/data/`
- `SimulationCodes/paper2/data/`
- `SimulationCodes/paper3/data/`