Step 0) **Unzip the file**
You will now have a folder named:

solitonic_reservoir-main/

Step 1) Open a terminal inside that folder:

Mac:
cd path/to/solitonic_reservoir-main

Windows (PowerShell):

- Shift + Right-click → *Open PowerShell window here*

- Or navigate manually into the folder.

WORKFLOW OPTION A (fast, recommended):

Step 2A) create clean environment and install dependencies:


```
python3 -m venv nlse_env
source nlse_env/bin/activate
# Windows: nlse_env\Scripts\activate
pip install numpy scipy matplotlib scikit-learn tqdm
```


Step 3 — Run Canonical ("Preload") Scripts in Order

From the repository root (e.g., solitonic_reservoir-main/):

Optional: Script 0, Figure 1 generator:
python preload_scripts/0_p_preload_soliton_fig1_generator.py

Preloaded Data Analytical Pipeline:
python preload_scripts/2_p_preload_Masterscript_analysis.py
python preload_scripts/3_p_preload_1B_fig2_generator.py

```
python preload_scripts/4_p_preload_1C_graph_extract1B_stats.py
python preload_scripts/6_p_preload_etaV2paper1B_viz_final.py
python preload_scripts/7_p_preload_G_T_derivatives.py
python preload_scripts/8_p_preload_statistical_analysis.py
```

What This Produces

- Robustness sweep plots

- NLSE vs LSE superiority figures

- g-sweep visualization

- Derivative/curvature analysis

- All statistics reported in the paper

All plots save into:

preload_figures/

###

WORKFLOW OPTION B (Advanced):

Full regeneration pipeline (SLOW)

This reproduces every experiment from scratch.

Use this ONLY if you want to regenerate all .npz data.

⚠️ Important: Scripts 1 and 5 take hours, depending on your machine.

Step 0) Unzip download
Step 1) Change directory
Step 2B) Install dependencies
Step 3) Run the full pipeline in order

From repo root:

```
python scripts/0_soliton_fig1_generator.py
python scripts/1_Master_script_statistics.py
python scripts/2_Masterscript_analysis.py
python scripts/3_1B_fig2_generator.py
python scripts/4_1C_graph_extract1B_stats.py
python scripts/5_etaV2paper1B_final.py
python scripts/6_etaV2paper1B_viz_final.py
python scripts/7_G_T_derivatives.py
python scripts/8_statistical_analysis.py
```

This regenerates:

- Full **η sweep (15 points × 10 seeds)**

- Complete **T-sweep**

- Complete **g-sweep**

- All figures and statistics

Outputs save into:

data/
figures/

Script	Purpose	Runtime
1_Master_script_statistics.py	Full 15-point jitter sweep × 10 seeds (NLSE vs LSE)	**Hours**
2_Masterscript_analysis.py	Linear regression / decay-rate analysis	Seconds
3_1B_fig2_generator.py	Generates NLSE–LSE superiority margin figure	Seconds
5_etaV2paper1B_final.py	Time-sweep and g-sweep simulations	**Hours**
6_etaV2paper1B_viz_final.py	g-margin visualization	Seconds

7_G_T_derivatives.py	Derivative and curvature analysis	Seconds
8_statistical_analysis.py	t-tests, Bonferroni correction, Cohen's d	Seconds

Quick Command Summary

From the repo root:

Canonical (Fast) Workflow

```
python preload_scripts/2p_preload_Masterscript_analysis.py
python preload_scripts/3p_preload_1B_fig2_generator.py
python preload_scripts/6p_preload_etaV2paper1B_viz_final.py
python preload_scripts/7p_preload_G_T_derivatives.py
python preload_scripts/8p_preload_statistical_analysis.py
```

Full Regeneration (Slow) Workflow

```
python scripts/1_Master_script_statistics.py
python scripts/2_Masterscript_analysis.py
python scripts/3_1B_fig2_generator.py
python scripts/5_etaV2paper1B_final.py
python scripts/6_etaV2paper1B_viz_final.py
python scripts/7_G_T_derivatives.py
python scripts/8_statistical_analysis.py
```