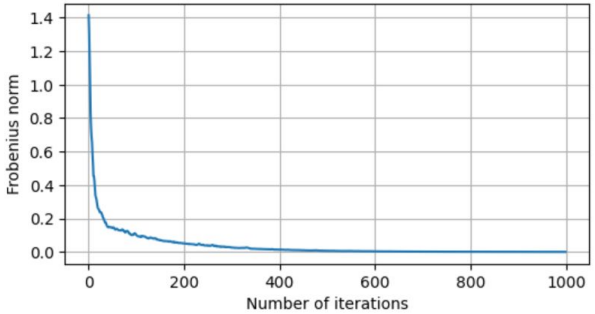
Hands-on session on Quantum Reservoir Computing (QRC)

https://github.com/gllodra12/Benchmarking_QRC

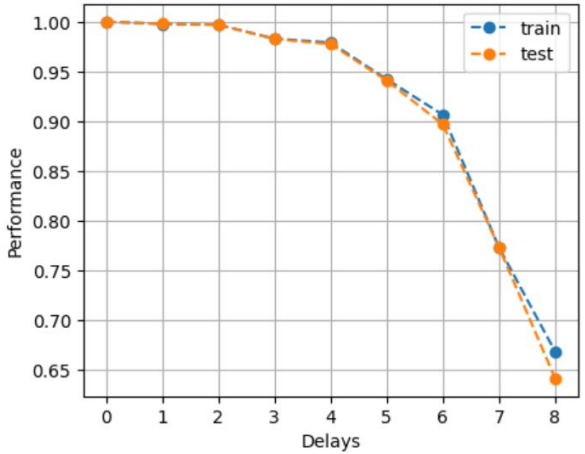
Goals of this session:

1. Define QRC dynamics and plot the Echo State Property (ESP).



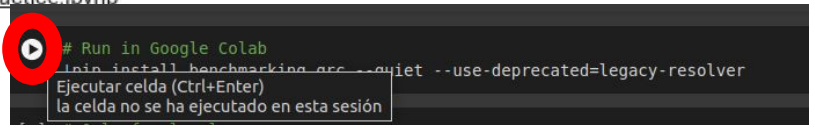
2. Train a QRC and asses the linear memory.
3. (Voluntary) Define your own QRC

Example: Ising model and plot (ESP) and linear memory



Let's start

1. Go to https://github.com/gllodra12/Benchmarking_QRC
2. Click in Google Colab and in notebooks/Practice.ipynb
3. Run each cell with Ctrl+Enter or click in



4. Let's complete the exercise 0 together:
   a. Write your code here:

```python
def initial_reservoir(num_sites, dim_site):
    """Density matrix with all states at |0>

    Args:
        num_sites (int): Number of sites in the system
        dim_site (int): Hilbert dimension of each site.
    """
    # Put your code here: Prepare the state |00><00|
```

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def initial_reservoir(num_sites, dim_site):
    """Density matrix with all states at |0>

    Args:
        num_sites (int): Number of sites in the system
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    """
    # Put your code here: Prepare the state |00><00|
    return qrc.reservoir.initial_state(num_sites, dim_site)
```

   b. Check if the solution is correct:

```
[20] num_sites, dim_site = 2, 2
     solution = initial_reservoir(num_sites, dim_site)
     exp_solution = np.array([[1, 0, 0, 0], [0]*4, [0]*4, [0]*4])

     check_solution(solution, exp_solution)

     Correct!
```