A probabilistic early-warning signal for noise-induced tipping in quasi-stationary regimes of metastability

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Precursors and indicators

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Early warning signals are simple properties that **change in characteristic ways** prior to a critical transition[1].

[1] Early Warning Signals toolbox

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Variance	✓	✗
Skewness	✗	✓

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[1] Early Warning Signals toolbox

Measures of incoming criticality

[2] Scheffer, M., Science, 338 (2012)

The stability landscape
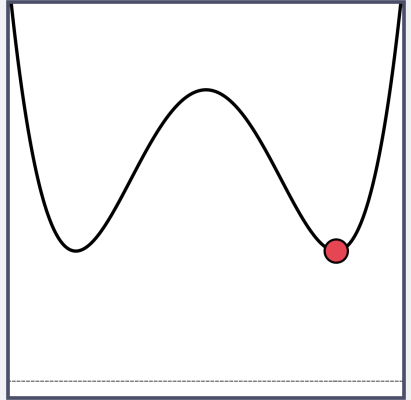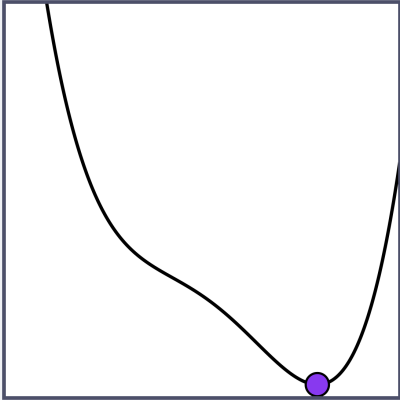
A numerical method

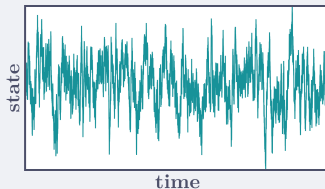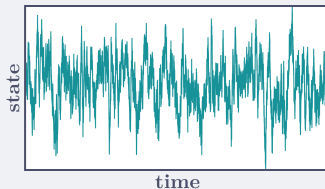**Objective**: derive an early-warning signal with the following desirable properties:

- has a physical interpretation;
- shows a consisten trend for an incoming tipping;
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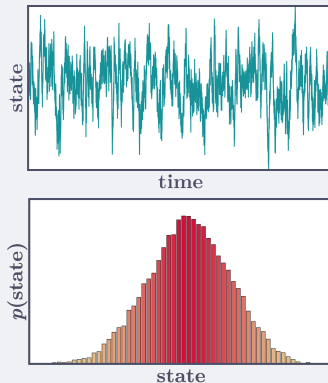
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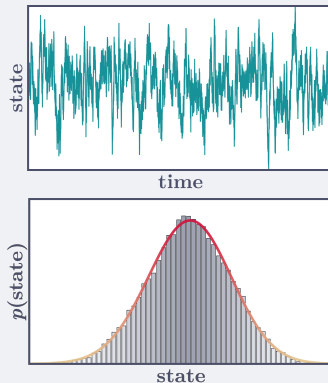**Objective**: derive an early-warning signal with the following desirable properties:

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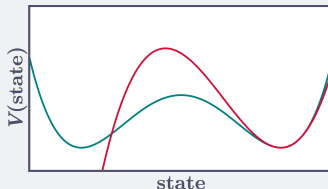
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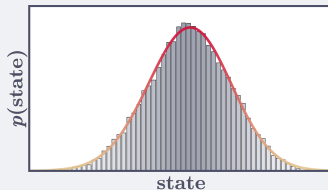
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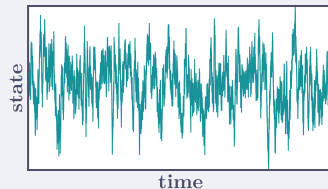
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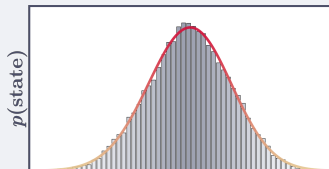
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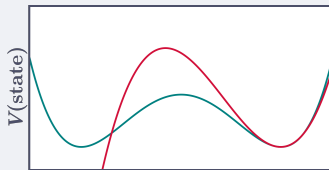   2.2) find the best curve fit;

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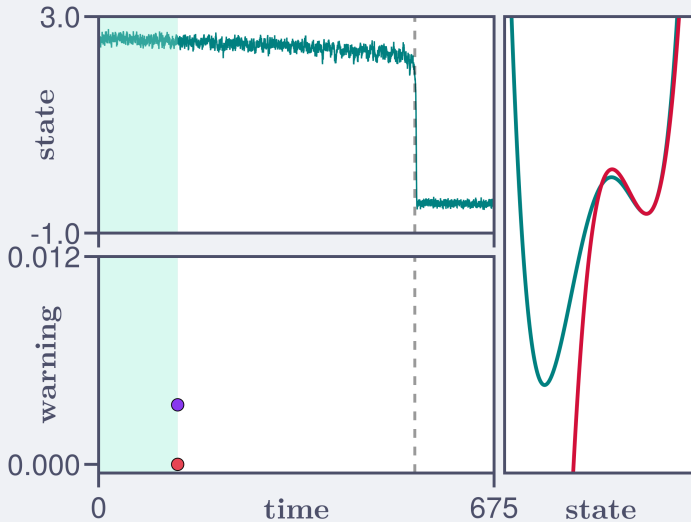
3) **Output**: probability of tipping[3]

[3] Kramers, H., Physica, 7 (1940)
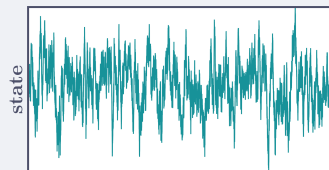
An EWS from data

[4] Kuehn, C., Physica D, 240 (2011)

References

📄 H. A. Kramers, Physica **7** (1940).

📄 C. Kuehn, Physica D **240** (2011).

📄 M. Scheffer, et al., Science **338** (2012).

Thank you.

▸ Go to beginning ▸ Go to the variance ews ▸ Go to numerical method