Random walk: multiple realizations
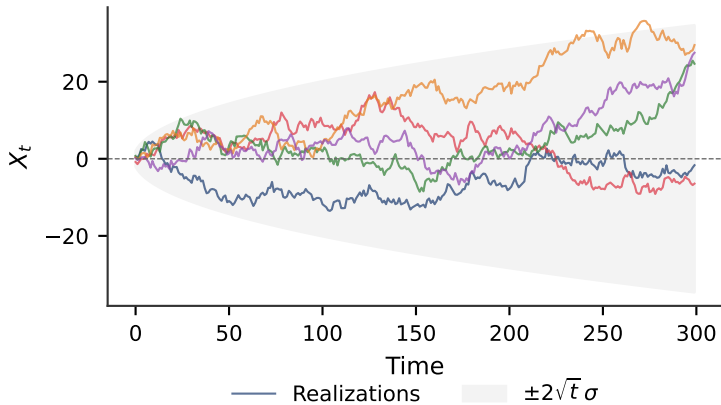
$Var(X_t) = t\sigma^2$ **grows linearly**

Realizations $\pm 2\sqrt{t}\,\sigma$

$\widehat{Var(X_t)}$ (empirical) $t \cdot \sigma^2$ (theoretical)