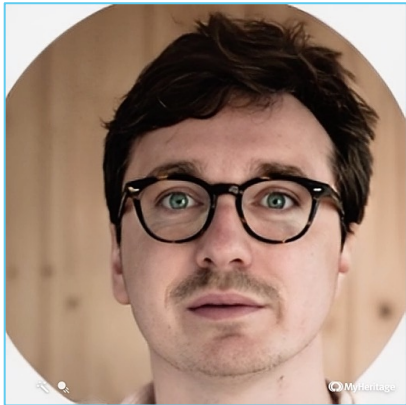
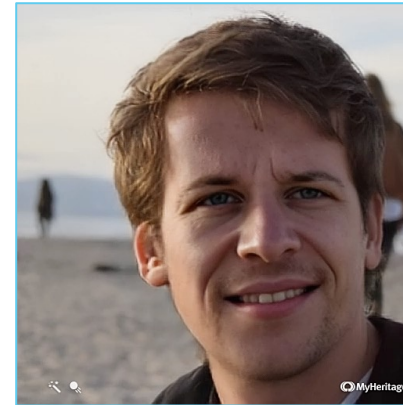


Stochastic processes for numerical integration

Diala HAWAT



Rémi BARDENET



Raphaël LACHIEZE-REY

Stochastic processes for numerical integration

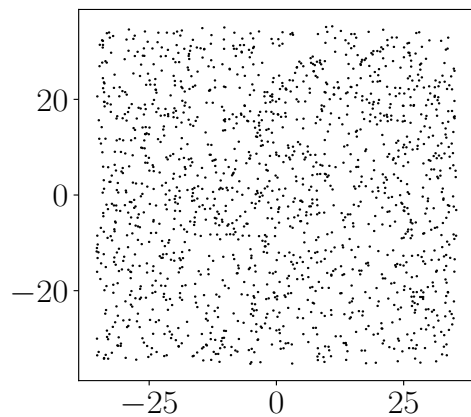
Stochastic processes for numerical integration

Point processes

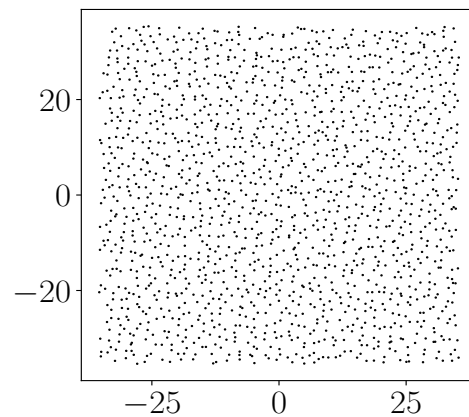


Stochastic processes for numerical
integration

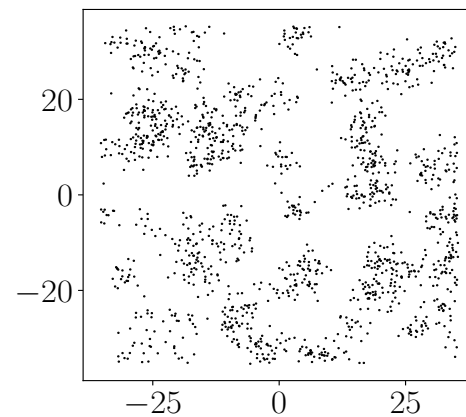
Independence



Repulsion



Attraction

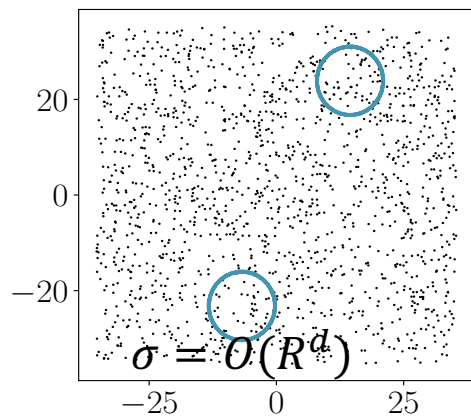


Point processes

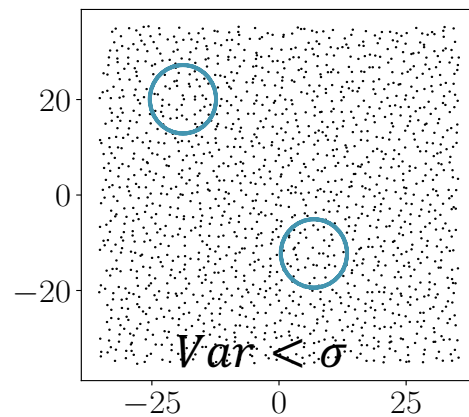


Stochastic processes for numerical integration

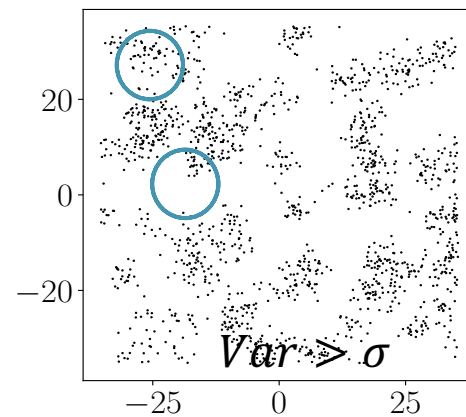
Independence



Repulsion



Attraction

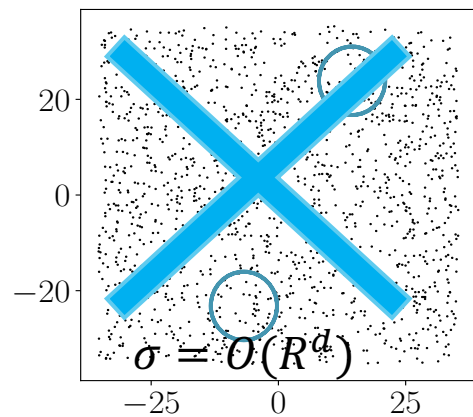


Point processes

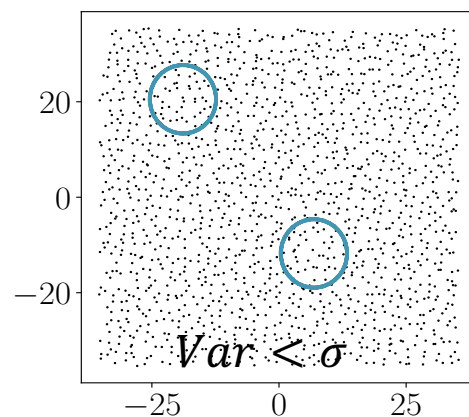


Stochastic processes for numerical integration

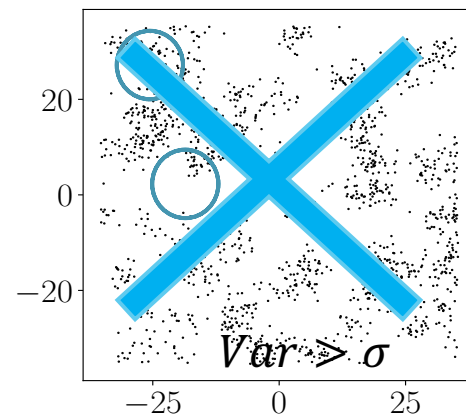
Independence



Repulsion



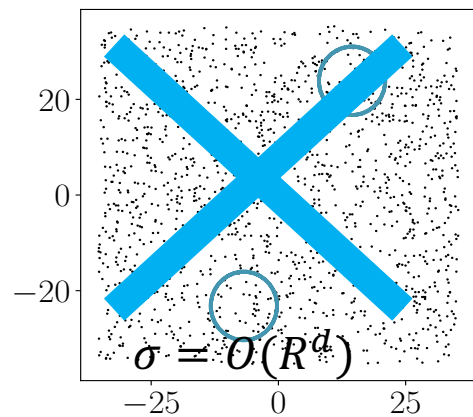
Attraction



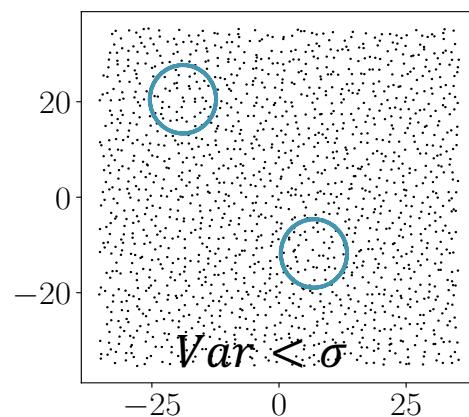
Point processes

Stochastic processes for numerical integration

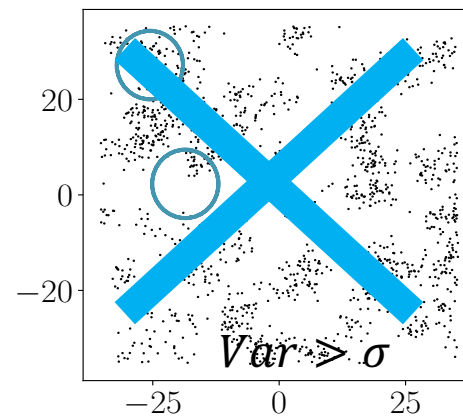
Independence



Repulsion



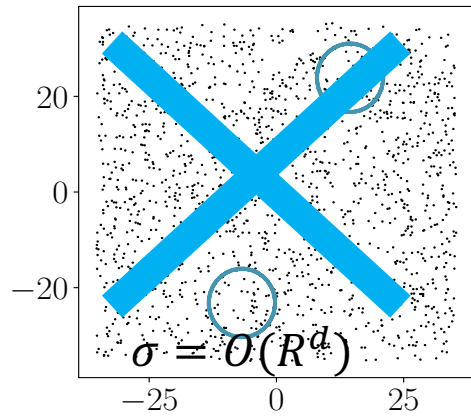
Attraction



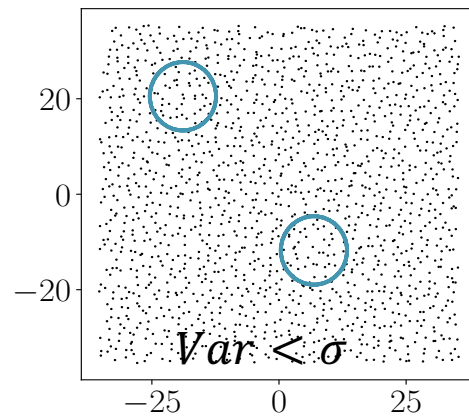
Point processes

Stochastic processes for numerical
integration

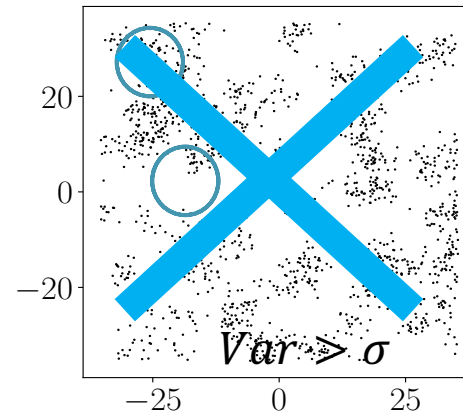
Independence



Repulsion



Attraction

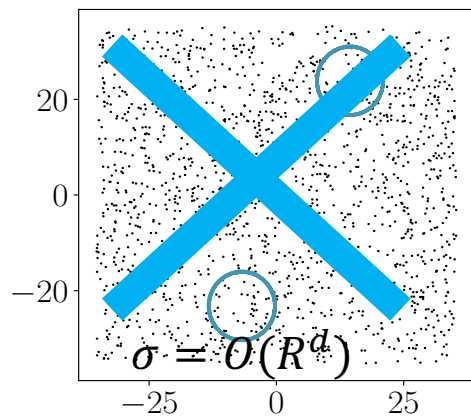


Point processes

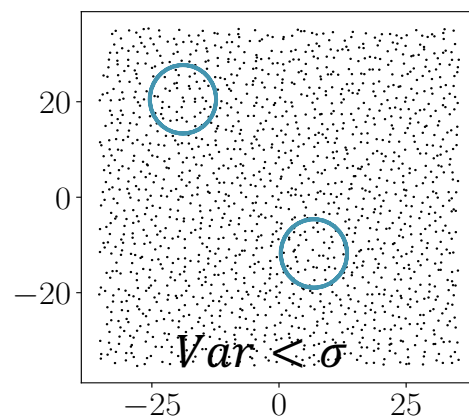
Stochastic processes for numerical integration

$$\int f(x) d\mu(x) \approx \sum_{i=1}^N w_i f(x_i)$$

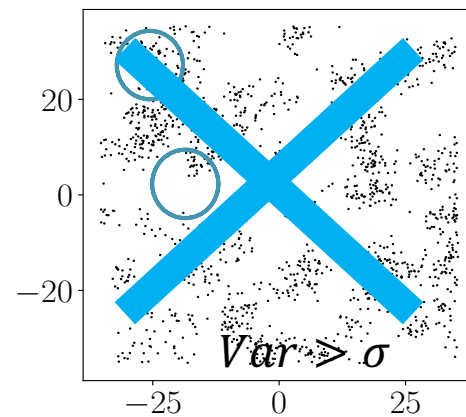
Independence



Repulsion



Attraction



Point processes

Stochastic processes for numerical integration

$$\int f(x) d\mu(x) \approx \sum_{i=1}^N w_i f(x_i)$$

Hyperuniform point processes

$$\lim_{R \rightarrow \infty} \frac{\text{Var}(\text{Card}(\mathcal{X}(B(0,R))))}{|B(0,R)|} = 0$$

Hyperuniform point processes

Joint work with Guillaume GAUTIER:



Preprint:

- On estimating the structure factor of a point process, with applications to hyperuniformity



arXiv



Code:

- Open-source Python toolbox “`structure_factor`”
- Detailed documentation
- Tutorial Jupyter notebook



Github



Documentation

Work in Progress



Construct a point process:

- Sub-Poisson variance
- Computationally tractable in any dimension
- Reduce (classical) MC variance

Thank you for your attention!

