A box of area is filled with uniformly distributed point particles. The density of points in the box is .

Suppose we look at a circle of radius centered someplace in the box. If the circle is relatively small and not centered near the outer edges, it is wholly contained in the box. The area of the circle compared to the area of the box is .

The number of particles within the circle depends on where the circle is located. The average number is just the particle density times the circle area:

This is a stochastic variable which acts Poisson-like so the standard deviation from the mean number of particles is approximately the square root of .

The coordination number of a particle with all particles within the circle goes like :

|  |  |  |
| --- | --- | --- |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

Particles very close to corners should have about a quarter of these number.

Another way to estimate the average coordination number is by performing the integral over all points where the circle can be centered. This can be estimated by Monte Carlo integration.