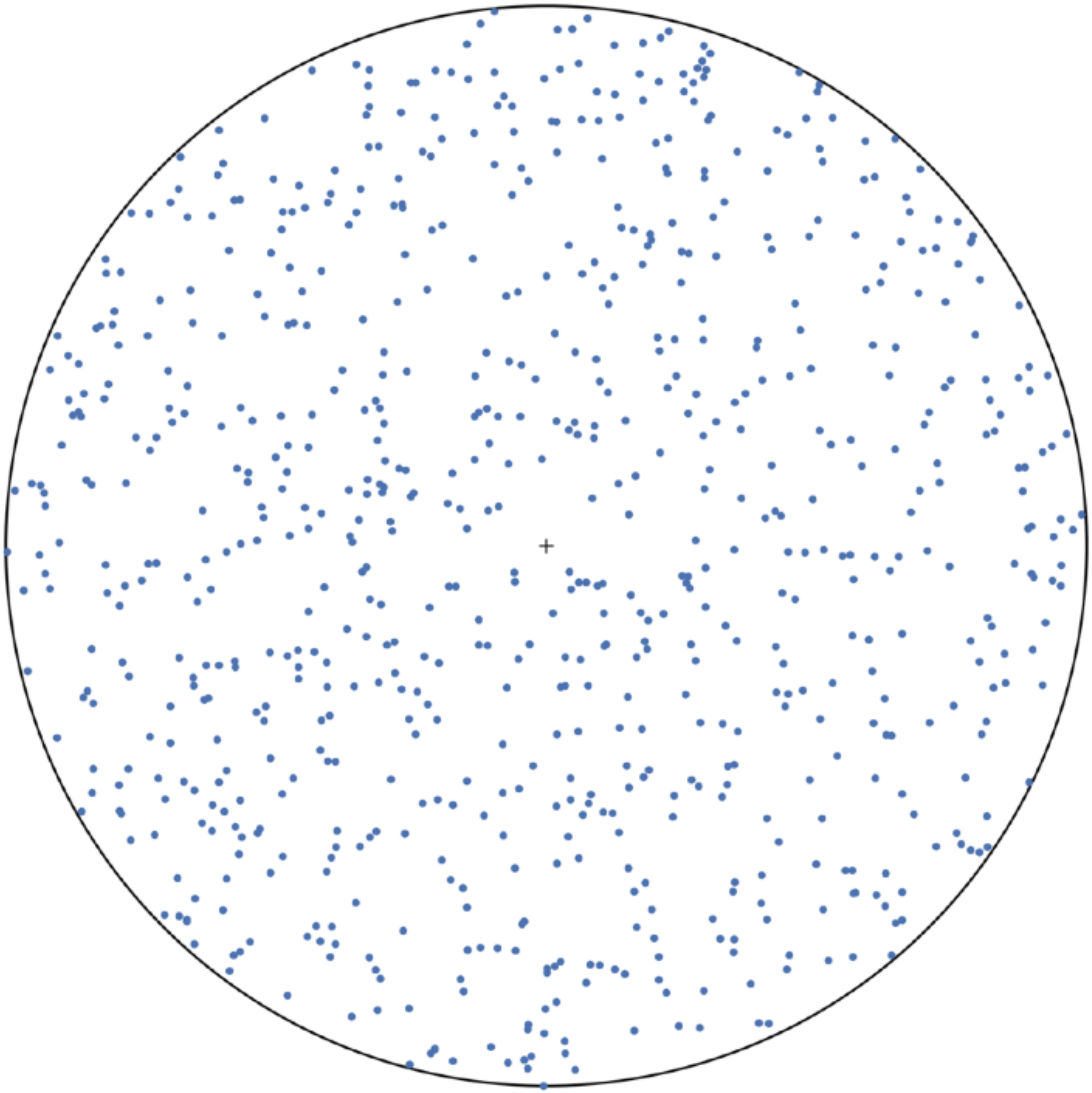

A geometric approach to clustering

Identity of indiscernibles	$d(x, y) = 0 \quad \Leftrightarrow \quad x = y$
Non-negativity	$d(x, y) \geq 0$
Symmetry	$d(x, y) = d(y, x)$
Triangle inequality	$d(x, y) \leq d(x, z) + d(z, y)$

Properties of any metric space

Simple random geometric graph

1. Sprinkle N nodes uniformly on a disk of radius R.
2. Connect any nodes separated by a distance less than r.

✓ high clustering

✗ binomial/Poisson degree distribution

Assume that the nodes are embedded in a metric space and that any two nodes are connected with a probability that is a decreasing function of the distance between them.

For further info, see Phys. Rep. 499, 1–101 (2011)

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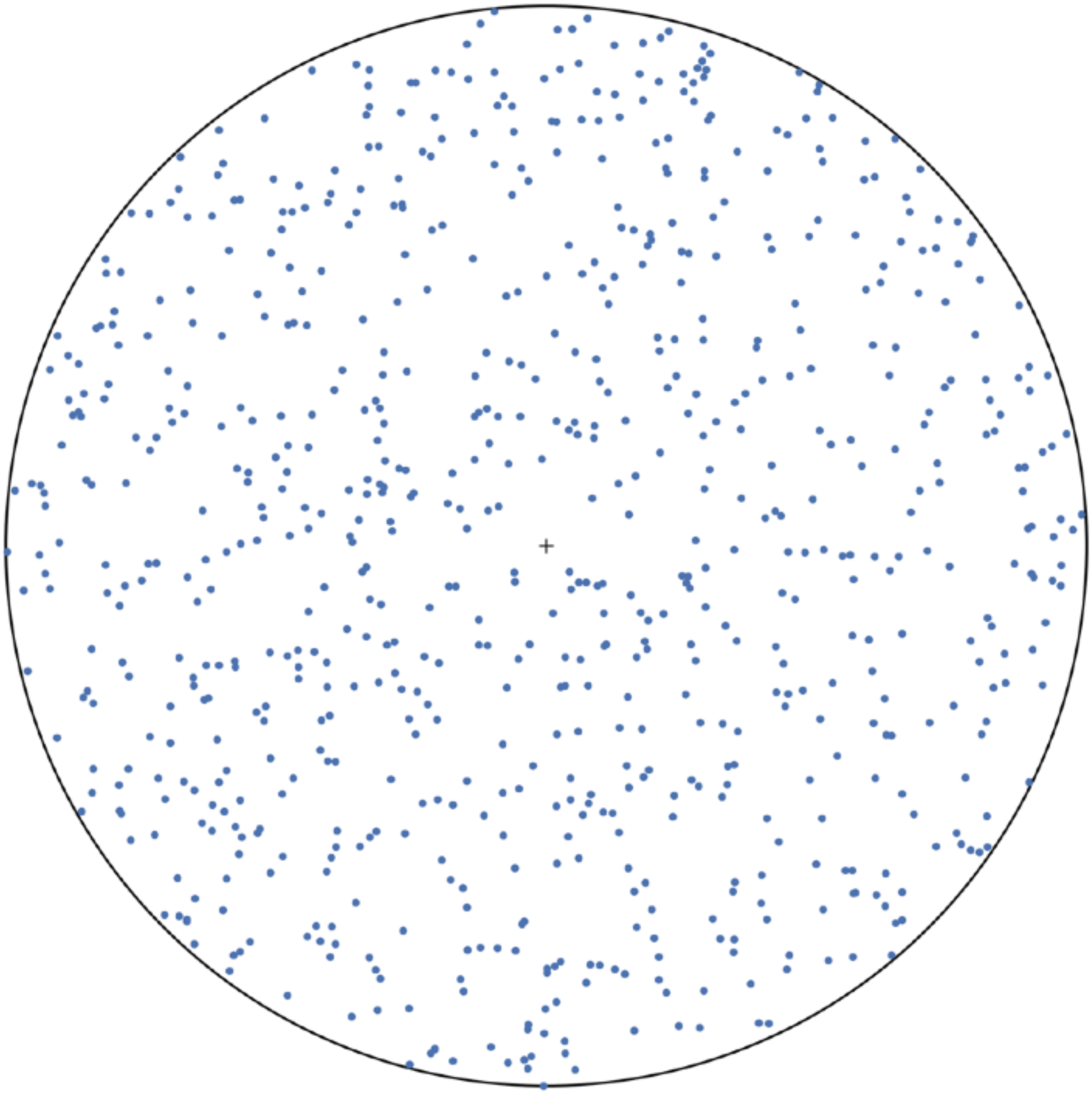
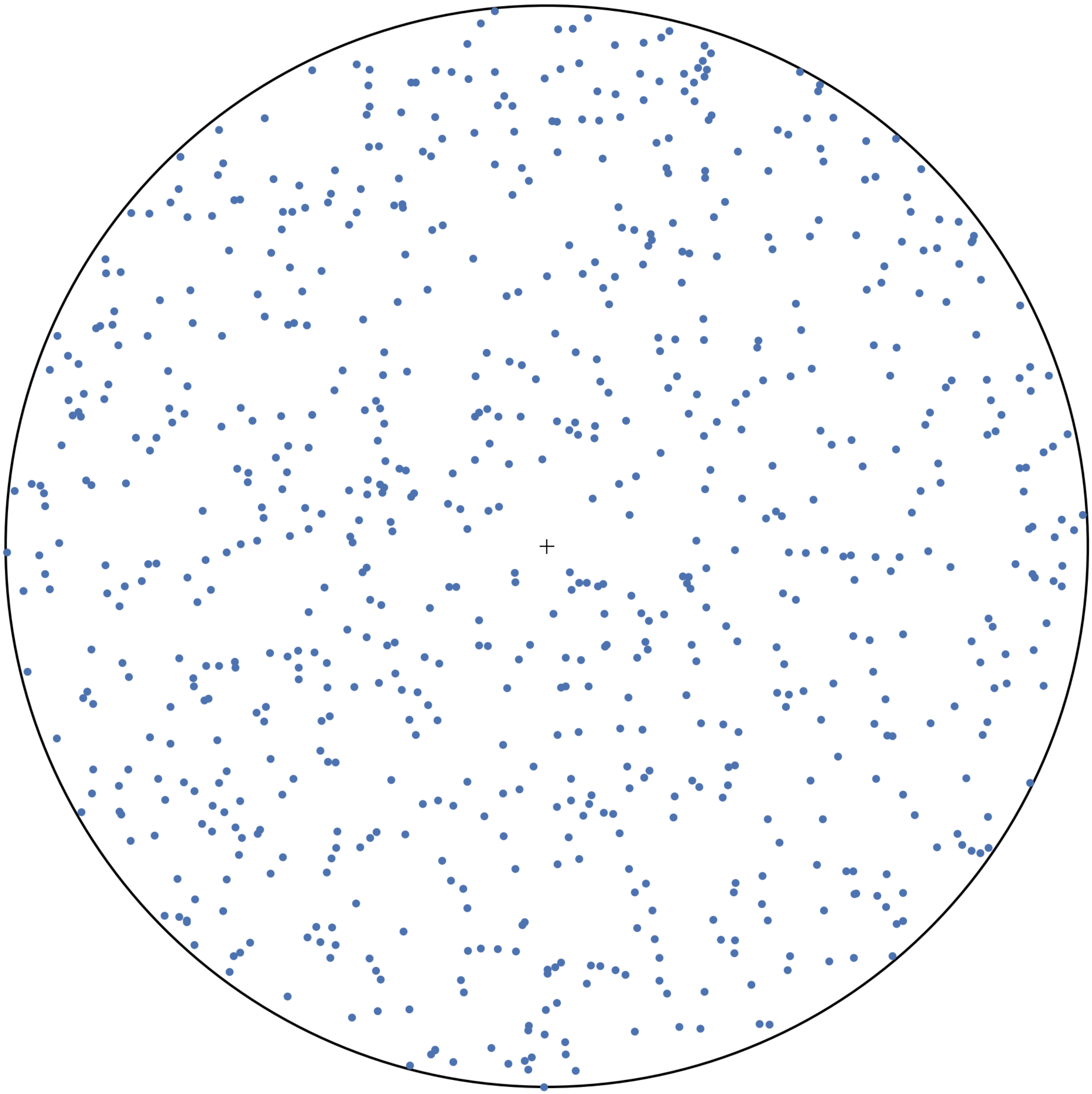
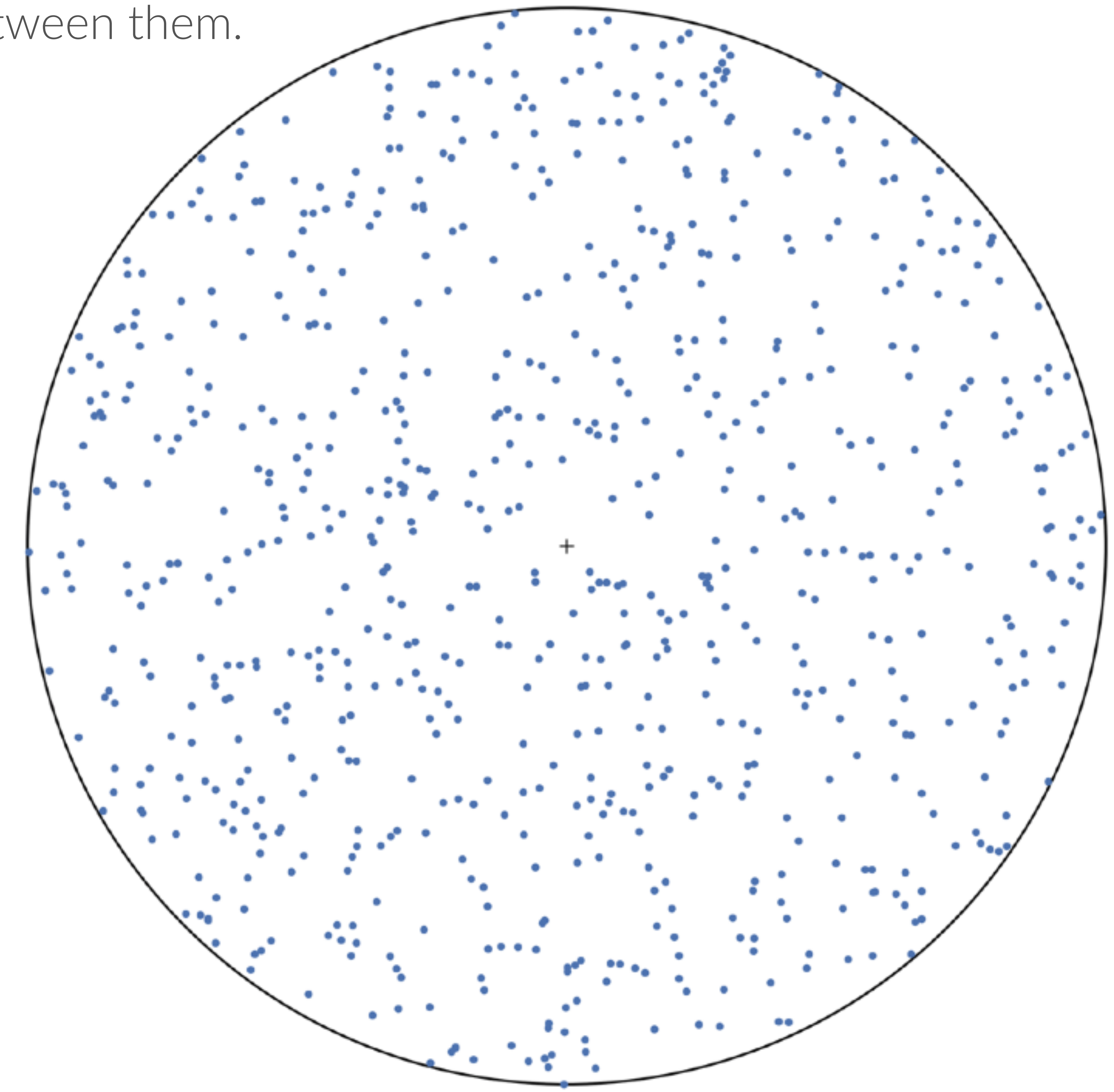




A geometric approach to clustering

Assume that the nodes are embedded in a metric space and that any two nodes are connected with a probability that is a decreasing function of the distance between them.



Properties of any metric space

Identity of indiscernibles	$d(x,y)=0 \quad \Leftrightarrow \quad x=y$
Non-negativity	$d(x,y)\geq 0$
Symmetry	$d(x,y)=d(y,x)$
Triangle inequality	$d(x,y)\leq d(x,z)+d(z,y)$

Simple random geometric graph

1. Sprinkle N nodes uniformly on a disk of radius R.
2. Connect any nodes separated by a distance less than r.

✓ high clustering

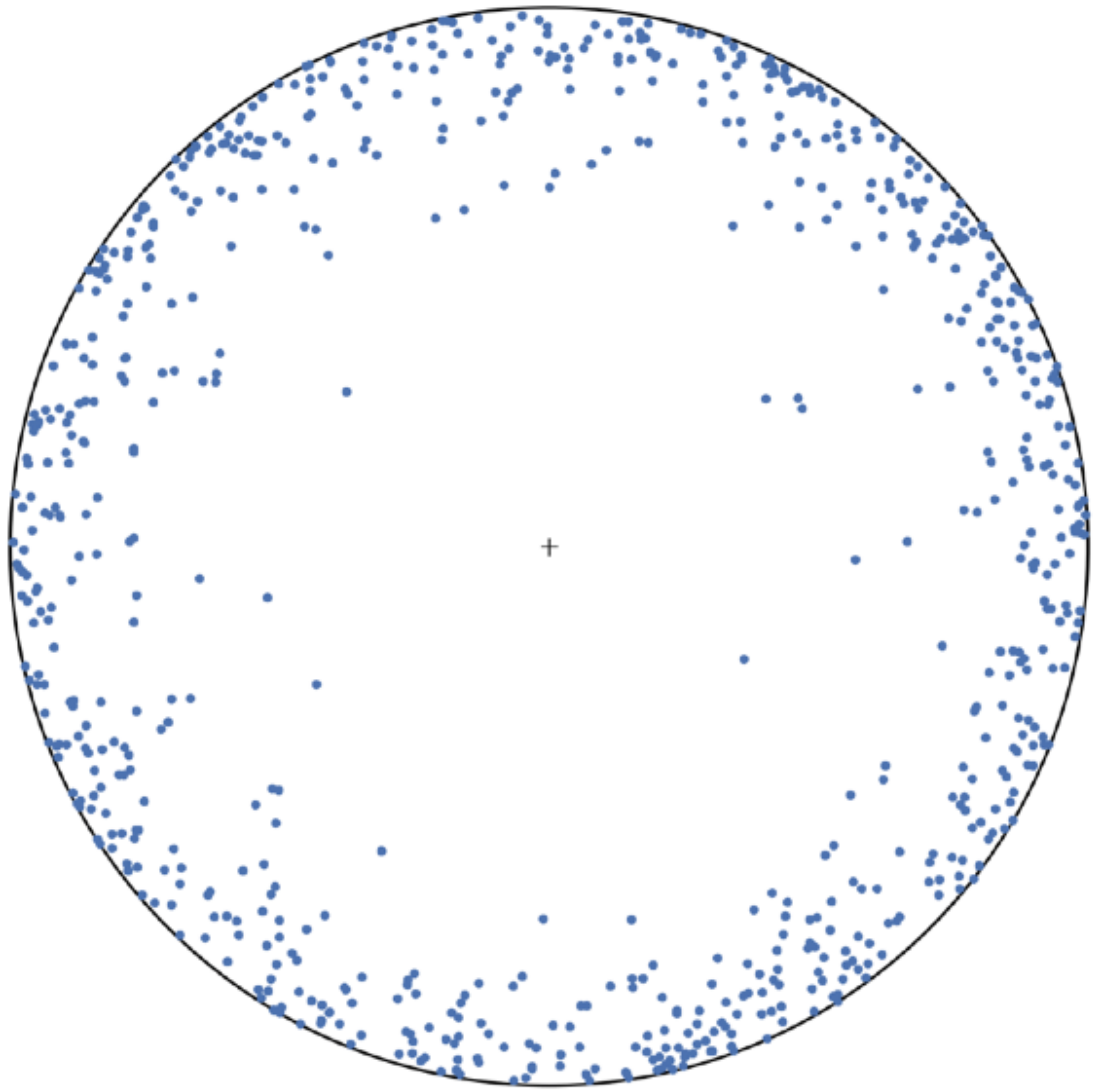
✗ binomial/Poisson degree distribution

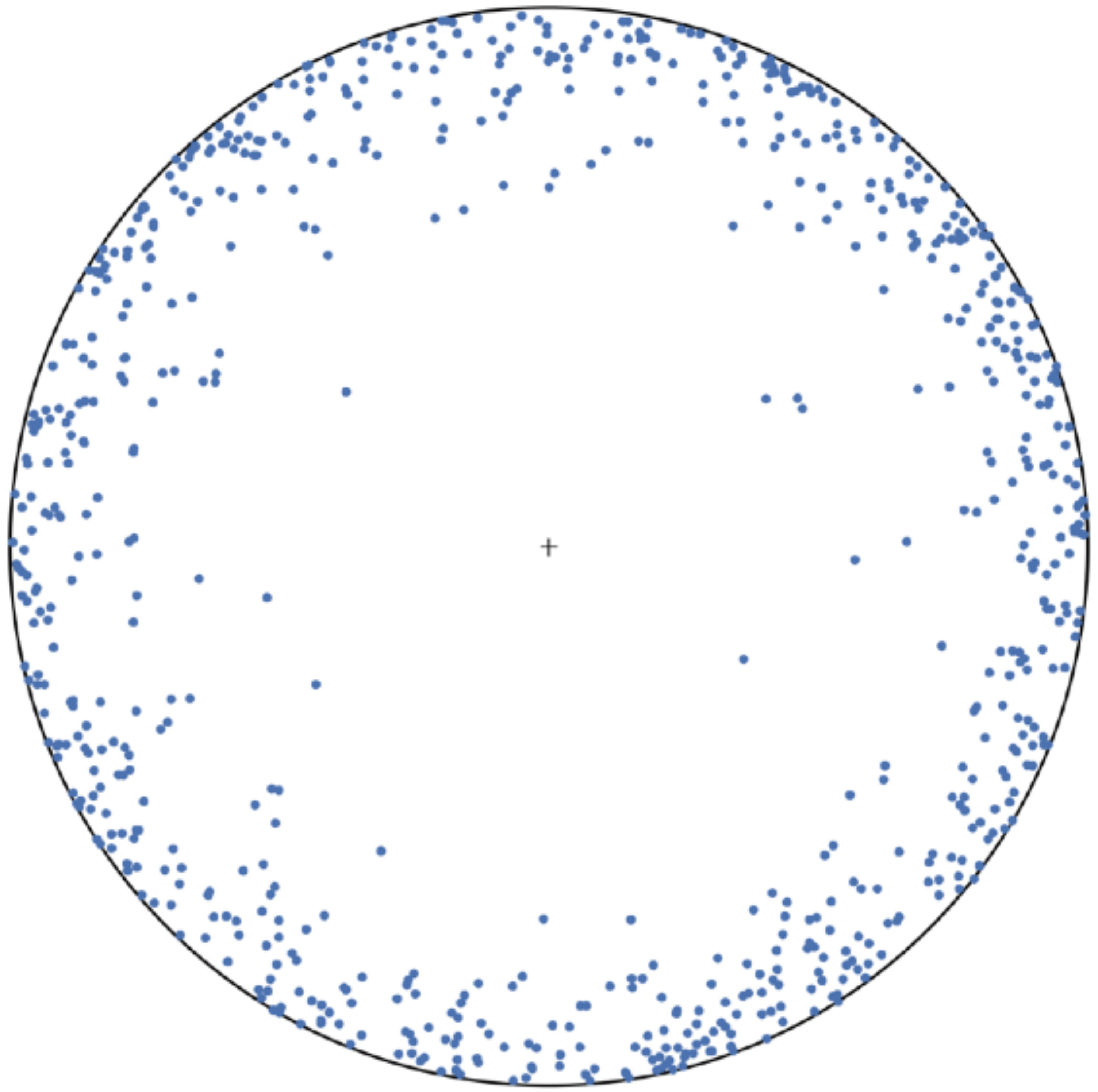
For further info, see Phys. Rep. 499, 1–101 (2011)

A geometric approach to clustering: Hyperbolic geometry

Simple random geometric graph

1. Sprinkle N nodes uniformly on the hyperbolic disk of radius R.
2. Connect any nodes separated by a distance less than $r = R$.





✓ high clustering

✓ power-law degree distribution with exponent -3

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