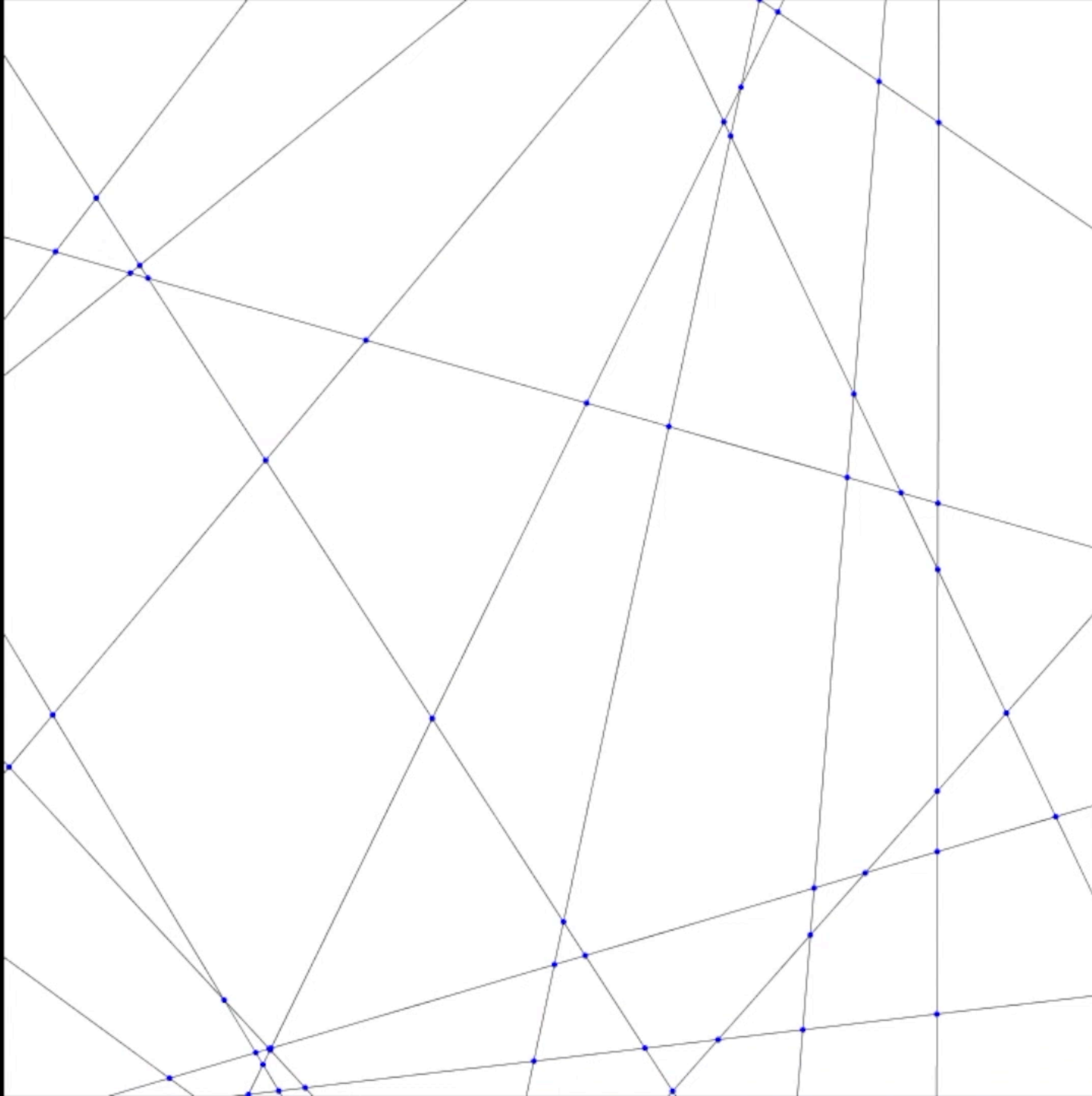

WEAK CONVERGENCE OF THE INTERSECTION POINT PROCESS OF POISSON HYPERPLANES

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(arXiv:2007.06398)

η_t (stationary, isotropic) Poisson hyperplane process of intensity t, $t > 0$.

$\eta_{t,R}$ restriction of η_t to the set of hyperplane intersecting the ball of radius R, $R > 0$.

$\Xi_{t,R} = \{H_1 \cap \cdots \cap H_d : (H_i)_i \in \eta_{t,R}^{(d)}\}$ intersection point process.

ζ Poisson point process on $\mathbb{R}^d \setminus \{0\}$ whose intensity measure M has density $x \mapsto c_2 \|x\|^{-(d+1)}$.

ASSUMPTIONS

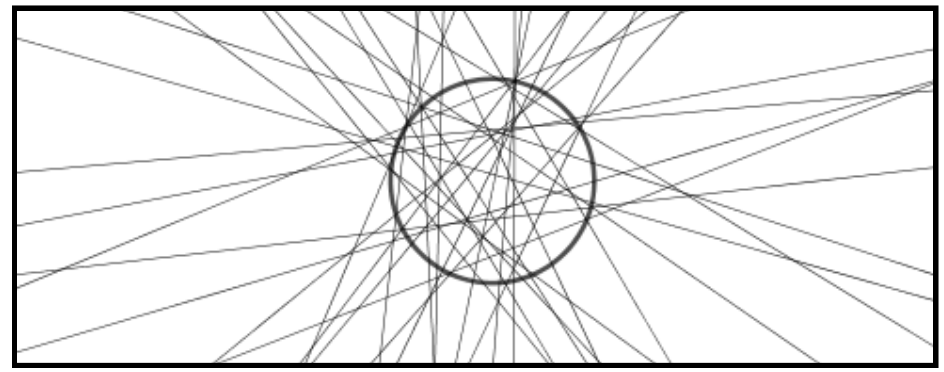
$R = t^{-\frac{d}{d+1}}$,
$t \to \infty$.

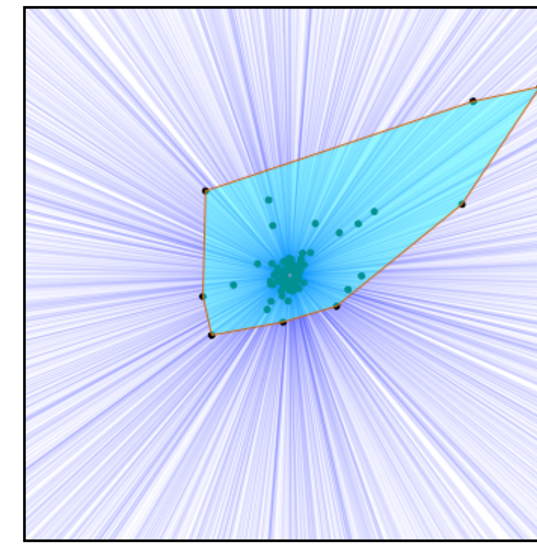
THEOREM (Bound on the K-R distance)

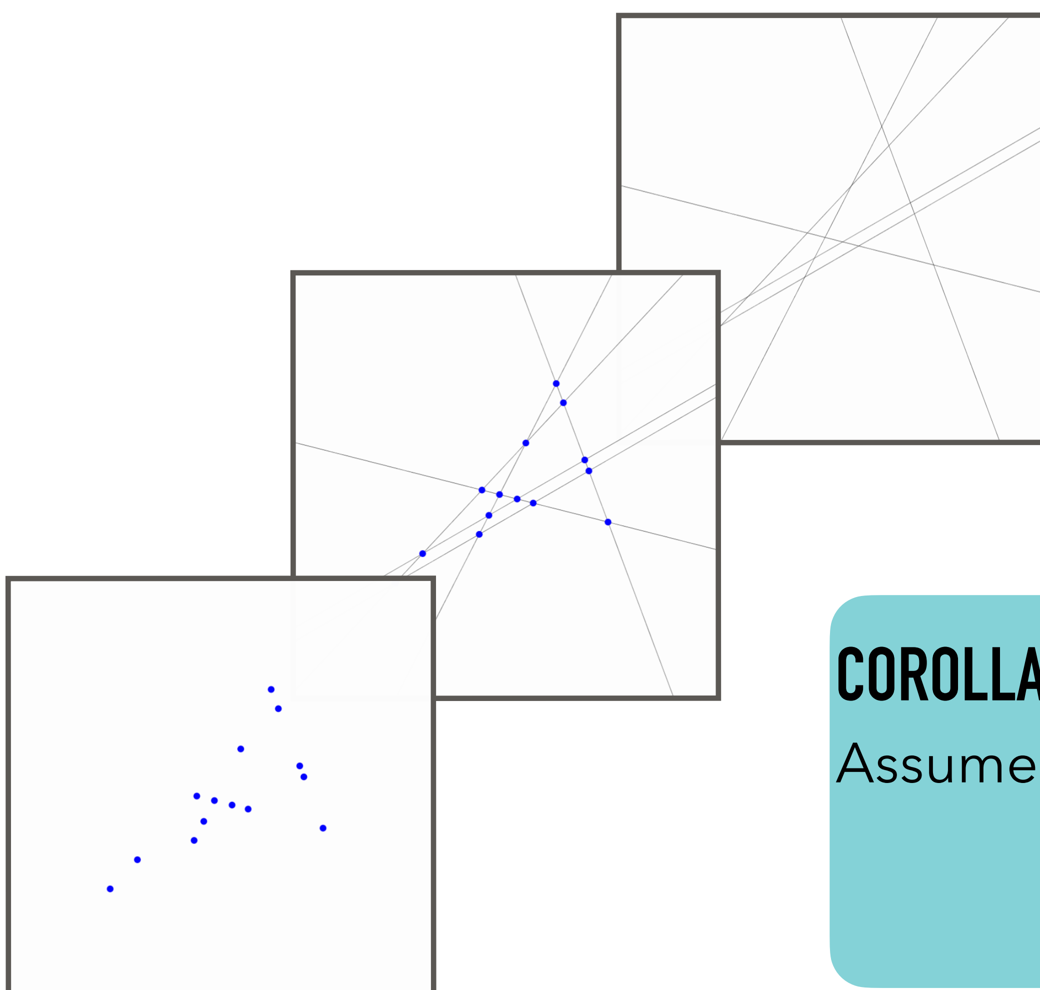
$$d_{\mathrm{KR}}(\Xi_{t,R|(B_r)^c}, \zeta_{|(B_r)^c}) \leq c t^{-\frac{1}{d+1}} \ln(t) r^{-3}.$$

THEOREM (Convergence in distribution)

$$\Xi_{t,R} \xrightarrow{d} \zeta, \quad t \to \infty .$$







COROLARRY (Convergence of the convex hull)

$$\operatorname{conv} \Xi_{t,R} \xrightarrow{d} \operatorname{conv} \zeta, \quad t \to \infty.$$

and, for any $k \in \{0, \dots, d\}$,

$$f_k(\operatorname{conv} \Xi_{t,R}) \xrightarrow{d} f_k(\operatorname{conv} \zeta), \quad t \to \infty.$$

COROLLARY (Disproval of a conjecture from [Devroye,Toussaint,1993])

Assume that $d = 2$. Then

$$\liminf_{t\to\infty} \mathbb{E} f_0(\operatorname{conv} \Xi_{t,R}) \geq \mathbb{E} f_0(\operatorname{conv} \zeta) = \frac{\pi^2}{2} > 4.$$