

Point processes. Some special cases.

1. a). *(Homogeneous) Poisson.*

Rate μ

$N(t)$, t in \mathbb{R}

Approaches.

I. With I_1, \dots, I_k disjoint sets of sizes $|I_1|, \dots, |I_k|$

$N(I_1), \dots, N(I_k)$ are independent Poissons with means

with means $\mu |I_1|, \dots, \mu |I_k|$, $k = 1, 2, \dots$

II. Conditional intensity.

$$\Pr\{dN(t) = 1 \mid N(u), u \leq t\} = \mu dt$$

III. $\tau_{j+1} - \tau_j$ i.i.d. exponentials mean $1/\mu$

Stationary, Markov

Parameters.

$$E\{dN(t)\} = E\{N(t, t + dt)\} = \mu dt$$

$$\Pr\{dN(t + u) = 1 \mid dN(t) = 1\} = \mu dt$$

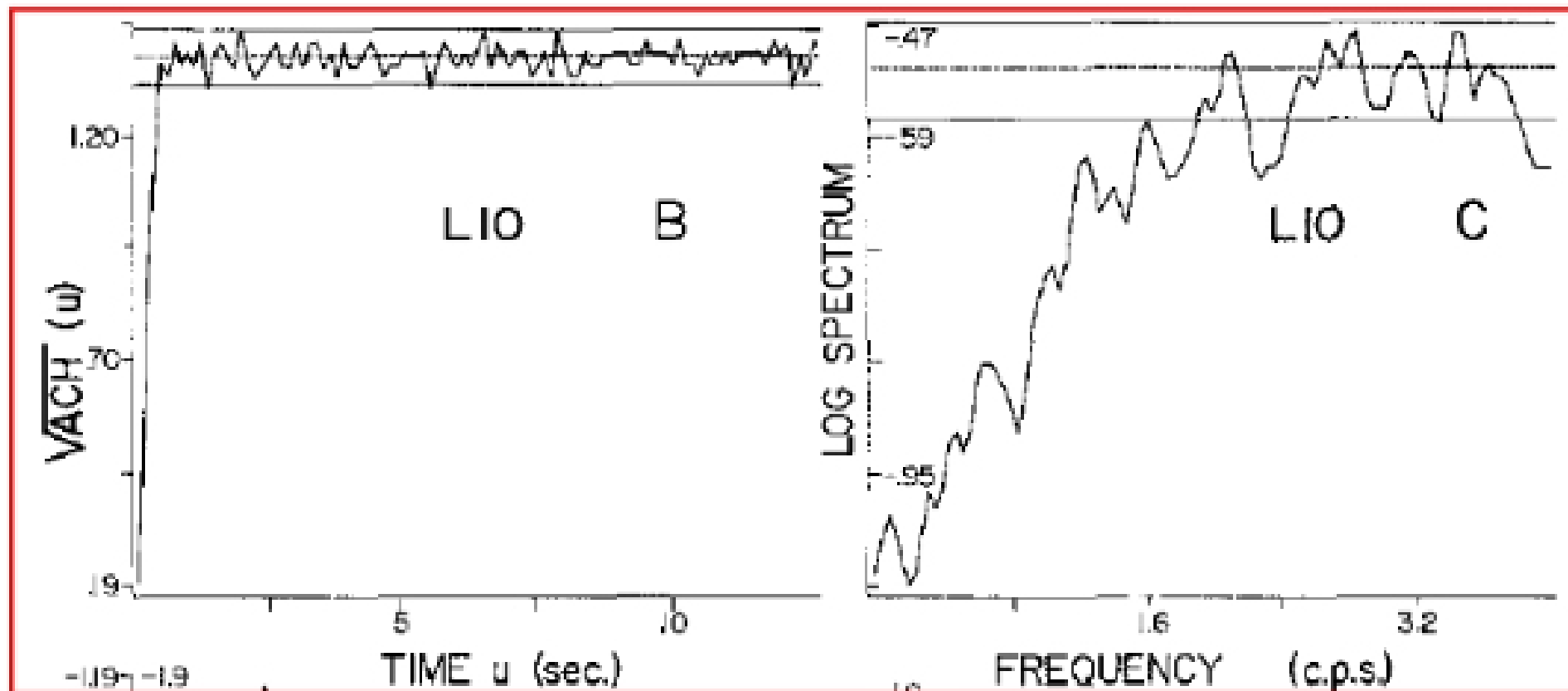
$$\text{cov}\{dN(t + u), dN(t)\} = \mu \delta(u) dt du,$$

independent increments

$$f_{\text{sv}}(\lambda) = \frac{\mu}{2\pi}, \quad -\infty < \lambda < \infty$$

Can use to check homogenous Poisson assumption

Examples



Brillinger, Bryant, Segundo Biological Cybernetics 22,213-228 (1976)