ESTIMADOR DE HAMILTON:

$$\xi^2_H(r) = \frac{DD(r)\,RR(r)}{DR(r)^2}$$

TENEMOS QUE $R = \int w\bar{n}\,dV$, ASÍ

$$R_1R_2 = \int \bar{n}_1 W_1\,dV_1 \int \bar{n}_2 W_2\,dV_2 = \iint \bar{n}^2 (W_1W_2)\,dV_1\,dV_2$$

ASÍ QUE $\qquad RR = \bar{n}^2 \langle\langle W_1W_2\rangle\rangle$

AHORA

$$DD = \int n W_1\,dV_1 \int n_2 W_2\,dV_2 = \iint n_1 n_2 W_1 W_2\,dV_1\,dV_2 \quad , \quad \text{PERO} \quad n = \bar{n}(1+\delta)$$

$$= \bar{n}^2 \iint (1+\delta_1)(1+\delta_2)\, W_1W_2\,dV_1\,dV_2$$

$$= \bar{n}^2\left(\langle\langle W_1W_2\rangle\rangle + \Psi_1\langle\langle W_1W_2\rangle\rangle + \Psi_2\langle\langle W_1W_2\rangle\rangle + \xi^{(2)}\langle\langle W_1W_2\rangle\rangle\right)$$

DONDE $\quad \Psi = \dfrac{\langle\langle W(r)W(r)\,\delta(r)\rangle\rangle}{\langle\langle W(r)\,W(r)\rangle\rangle} \quad$ y $\quad \xi^{(2)}(r) = \dfrac{\langle\langle W(r)\,W(r)\,\delta(r)\,\delta(r)\rangle\rangle}{\langle\langle W(r)\,W(r)\rangle\rangle}$

AHORA

$$DR = \int n_1 W_1\,dV_1 \int \bar{n} W_2\,dV_2 = \bar{n}^2 \iint (1+\delta_1)\,W_1W_2\,dV_1\,dV_2$$

$$= \bar{n}^2\left(\iint W_1W_2\,dV_1\,dV_2 + \iint \delta_1 W_1W_2\,dV_1\,dV_2\right)$$

$$DR = \bar{n}^2\left(\langle\langle W_1W_2\rangle\rangle + \Psi_1\langle\langle W_1W_2\rangle\rangle\right)$$

ASÍ

$$(DR)^2 = \bar{n}^4\left(\langle\langle W_1W_2\rangle\rangle^2 + 2\Psi_1\langle\langle W_1W_2\rangle\rangle^2 + \Psi_1^2\langle\langle W_1W_2\rangle\rangle^2\right)$$

ASÍ QUE

$$1 + \xi^2_H(r) = \frac{DD(r)\,RR(r)}{DR(r)^2} = \frac{\bar{n}^4\langle\langle W_1W_2\rangle\rangle\left(\langle\langle W_1W_2\rangle\rangle + \Psi_1\langle\langle W_1W_2\rangle\rangle + \Psi_2\langle\langle W_1W_2\rangle\rangle + \xi^2\langle\langle W_1W_2\right.}{\bar{n}^4(1 + 2\Psi_1 + \Psi_1^2)\langle\langle W_1W_2\rangle\rangle^2}$$

$$= \frac{(1 + \Psi_1 + \Psi_2 + \xi^2)}{(\Psi_1+1)^2}$$

ASÍ QUE

$$\xi^2_H(r) = \frac{1 + \Psi_1 + \Psi_2 + \xi^2 - \Psi_1^2 - 2\Psi_1 - 1}{(\Psi_1+1)^2} = \boxed{\frac{\xi^2 - \Psi_1 + \Psi_2 - \Psi_1^2}{(\Psi_1+1)^2} = \xi^2_H(r)}$$

Estimador Landy - Szalay

$$\xi^{(2)}_{12}(r) = \frac{DD(r) + RR(r) - 2DR(r)}{RR(r)}$$ , para dif. numero de D y R

$$\xi^{(2)}_{12}(r) = 1 + \frac{1}{N^2_{est}} \frac{DD(r)}{RR(r)} - 2\frac{1}{N_{est}} \frac{DR(r)}{RR(r)}$$

así

$$N_{est} = \frac{D}{R} = \frac{\int n w \, dV}{\int \bar{n} w \, dV} = \frac{\bar{n} \int (1+\delta) w \, dV}{\bar{n} \int w \, dV}$$

$$= \frac{\langle w \rangle + \bar{\delta} \langle w \rangle}{\langle w \rangle} = 1 + \bar{\delta}$$ , donde $\bar{\delta} = \frac{\langle w \delta(r) \rangle}{\langle w \rangle}$

así

$$\xi^{2}_{12}(r) = 1 + \frac{1}{(1+\bar{\delta})^2}\left(1 + \mathcal{Y}_1 + \mathcal{Y}_2 + \xi^{(2)}\right) - \frac{2}{1+\bar{\delta}}(1+\mathcal{Y}_1)$$

$$= \frac{(1+\bar{\delta})^2 + (1 + \mathcal{Y}_1 + \mathcal{Y}_2 + \xi^{(2)}) - 2(1+\bar{\delta})(1+\mathcal{Y}_1)}{(1+\bar{\delta})^2}$$

$$= \frac{\cancel{1} + \cancel{2\bar{\delta}} + \bar{\delta}^2 + \cancel{1} + \mathcal{Y}_1 + \mathcal{Y}_2 + \xi^{(2)} - \cancel{2} - 2\mathcal{Y}_1 - \cancel{2\bar{\delta}} - 2\bar{\delta}\mathcal{Y}_1}{(1+\bar{\delta})^2}$$

$$\boxed{\xi^{(2)}_{12}(r) = \frac{\xi^{(2)} - \mathcal{Y}_1 + \mathcal{Y}_2 - 2\bar{\delta}\mathcal{Y}_1 + \bar{\delta}^2}{(1+\bar{\delta})^2}}$$

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