- Béla LUKÁCS (Wigner):

- Fe abundance in the early Universe and standard candles in astrophysics

Universe

- $ds^2 = dt^2 - R^2(t)d^2\chi$

$\forall \chi = \{x,\theta,\phi\}$, **$\theta,\phi$ can be taken 0**

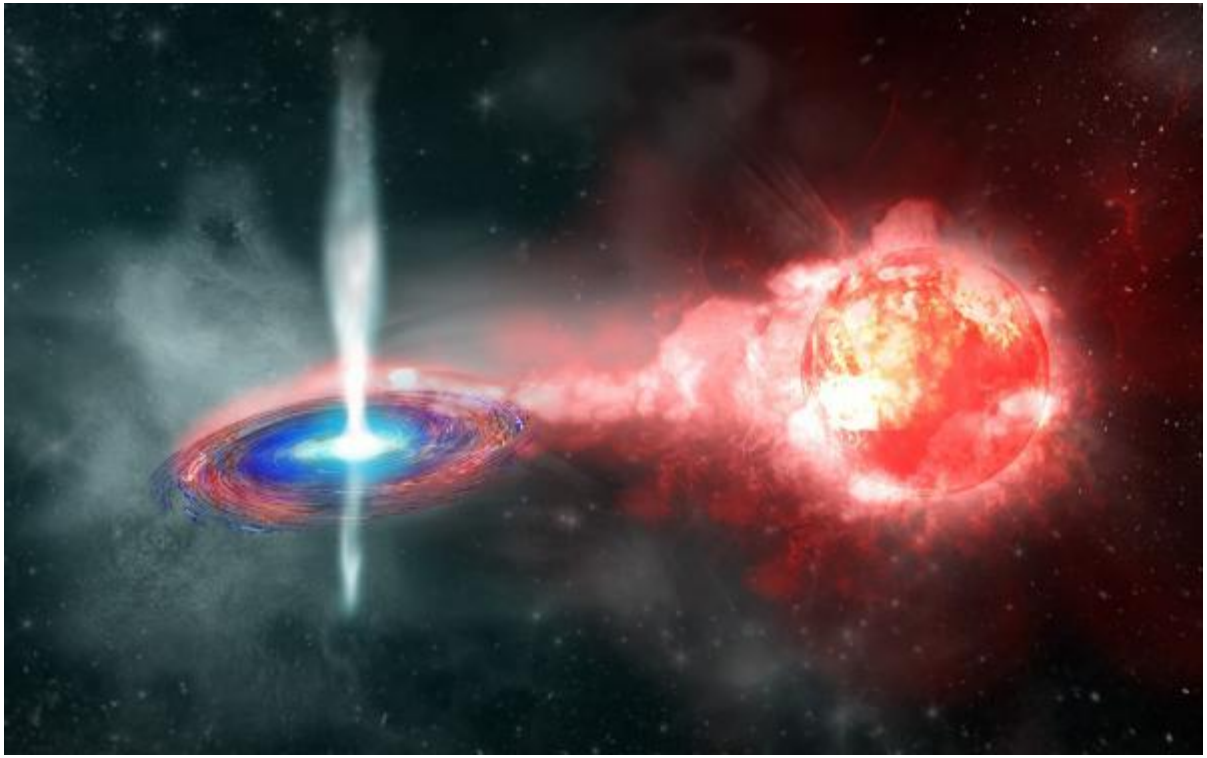
$\forall$ $1+z = R(t_0)/R(t)$

- **z = z(x)**
- **x is the comoving coordinate, for galaxies x is cca. const.**
- **x(z) depends on R(t)**

How to measure R(t)?

- If we have standard candles, we measure the apparent brightness and the redshift and from them R(z) is got, and then R(t) as well.
- Hope: SN 1a's are standard candles.
- Hence comes the 2011 Nobel price: $\Lambda_{\text{dimensionless}}$ is cca. 2/3.
- Is it sure that SN 1a's are standard candles?

Present view for SN 1a



Are They?

- SN 1a's seem standard candles for the present, but, if the picture about them is correct, then it is doubtful for the early Universe, and it is hopeless to collect direct evidence because direct distances from, say, Cepheids are unavailable beyond the nearby galaxies. And the Chandrasekhar limit was age-dependent.

Chandrasekhar limit, Fe &c.

- M_{Ch} is the max. mass of a white dwarf, and even for a chemically homogeneous dwarf it is explicitly composition-dependent:
- M_{Ch}/M_{Sol} = 5.75 for H, 1.44 He, 1.26 Fe
- Energy output c. M_{Ch}^2
- The early Universe was metal-free, metals were produced gradually, and for a 10.5 billion year environment??

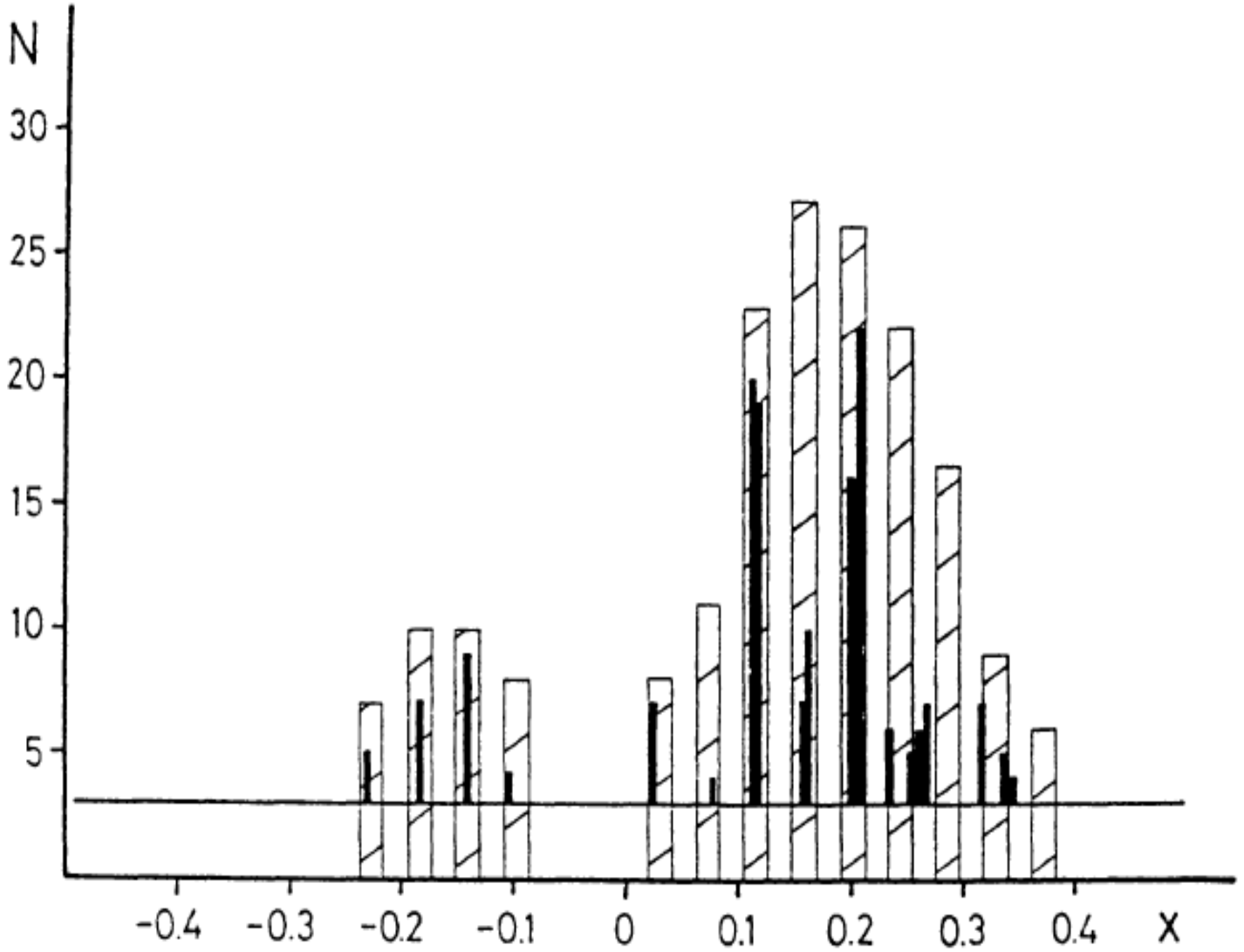


Fig. 1a. Schematic histogram of the numbers of galaxies N (black strips) as a function of comoving coordinate x for the flat dust model, $q_0 = +0.5$; $x > 0$ for NGP direction, $x < 0$ for SGP. The hatched areas indicate regions inside $\pm 25\%$ deviations from an exact periodicity. For details see the text.

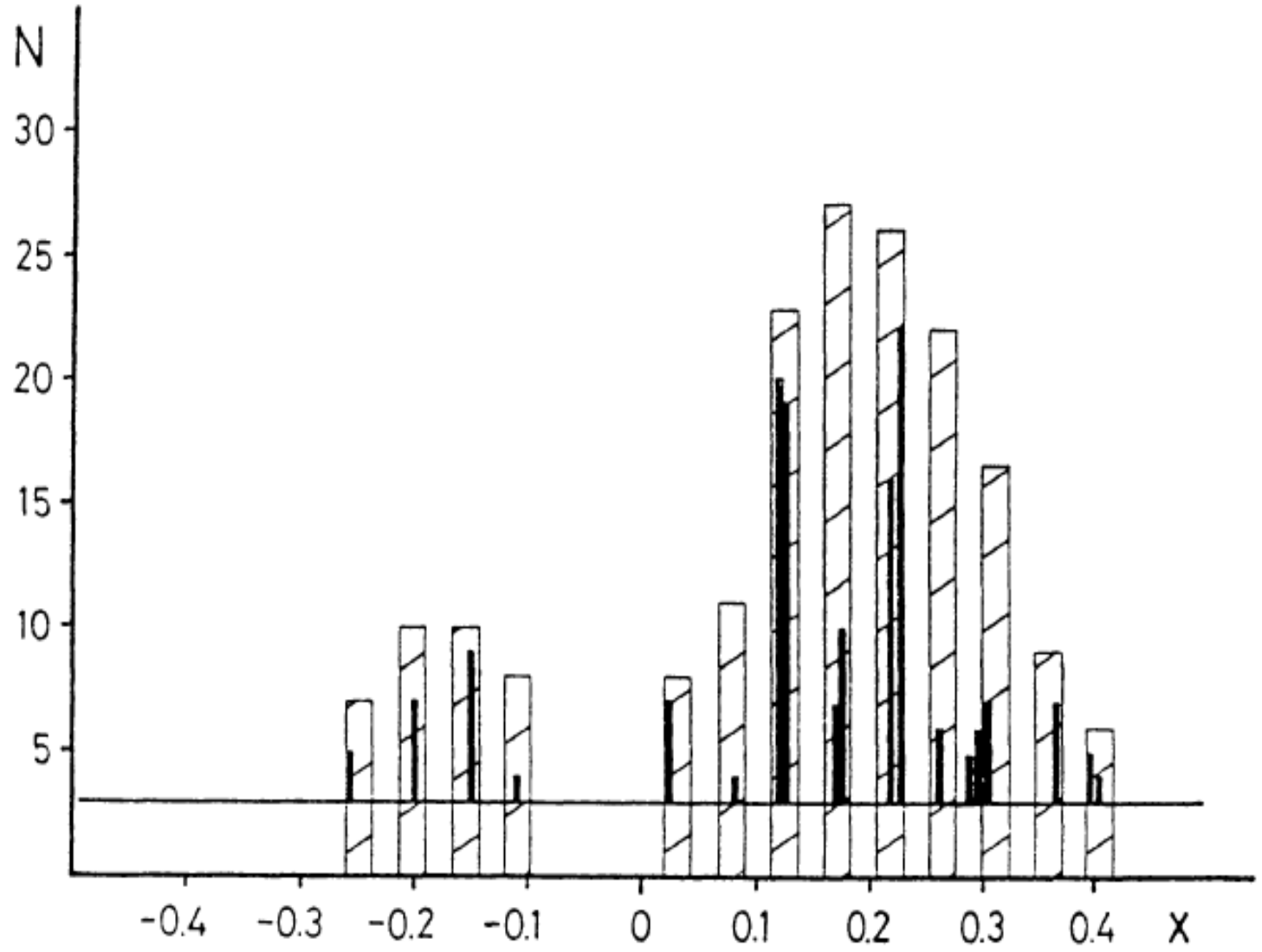


Fig. 1b. As Figure 1(a), for a flat vacuum + dust model with $q_0 = -0.5$.

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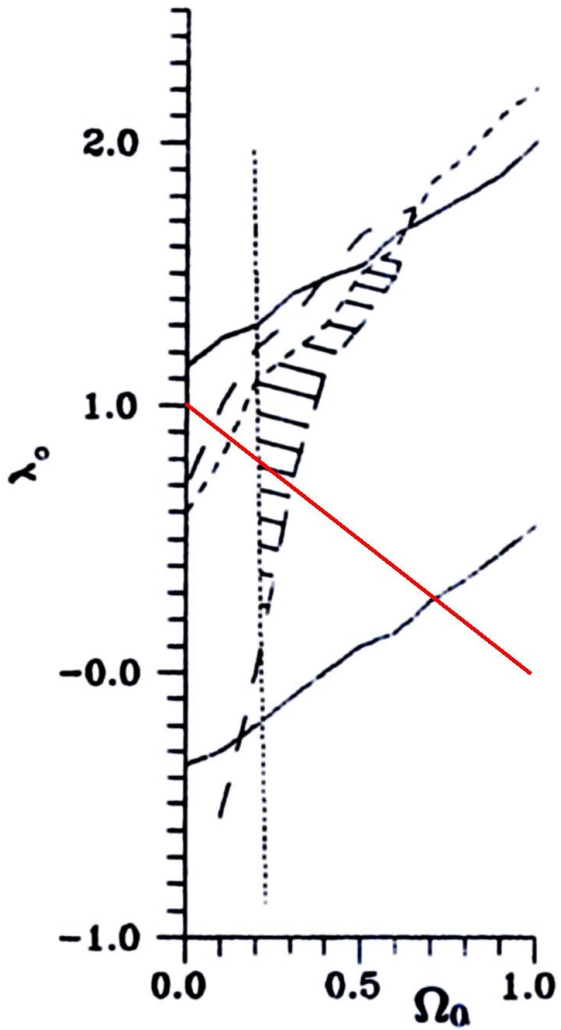

Fig. 8. The admissible region of regularity on the (Ω_0, λ_0) plane. Solid: 80% significance border of regularity for galaxies. Long dash: Same for radio quasars. Short dash: Same for optical quasars. Dotted: Lower density limit. Hatched: The admissible region.

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