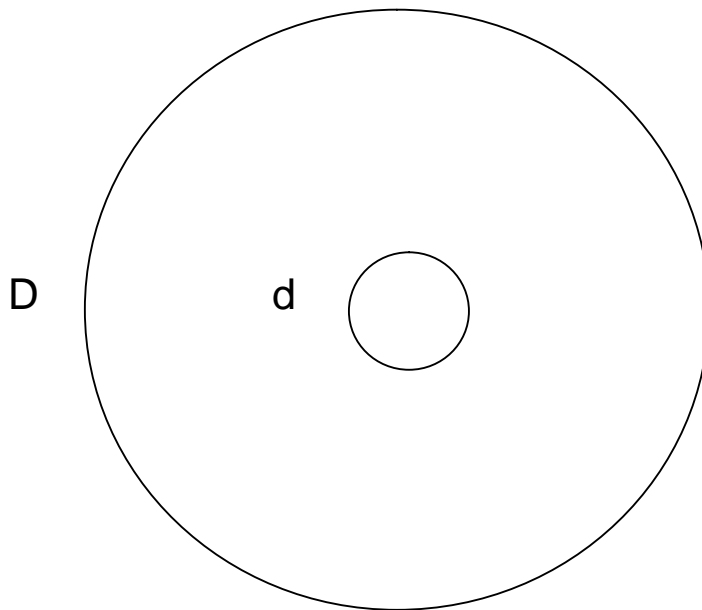


Information density of a DVD

by **Werner Gitt**



Area of stored information on a DVD:

$$D = 117.5 \text{ mm}$$

$$d = 43.5 \text{ mm}$$

Thickness of a DVD:

$$\delta = 1 \text{ mm}$$

$$\text{Area: } A = (D^2 - d^2) \cdot \pi / 4 = (117.5^2 - 43.5^2) \cdot \pi / 4 = 9357.2 \text{ mm}^2$$

$$\text{Volume: } V = A \cdot \delta = 9357.2 \text{ mm}^3 = 9.3572 \text{ cm}^3$$

Information on a DVD: $I = 4.7$ Gigabytes, (1 byte = 8 bits)

$$I = 4.7 \cdot 10^9 \text{ bytes} = 8 \cdot 4.7 \cdot 10^9 \text{ bits} = 37.6 \cdot 10^9 \text{ bits}$$

$$\text{Information density of a DVD: } \rho_{\text{DVD}} = 37.6 \cdot 10^9 \text{ bits} / 9.3572 \text{ cm}^3 = 4 \cdot 10^9 \text{ bits/cm}^3$$

Information density of the DNA molecule: $\rho_{\text{DNA}} = 1.88 \cdot 10^{21} \text{ bits/cm}^3$

(See: W. Gitt: In the Beginning was Information, CLV, p. 192)

Comparison:

$$\rho_{\text{DNA}} / \rho_{\text{DVD}} = 1.88 \cdot 10^{21} \text{ bits/cm}^3 / 4 \cdot 10^9 \text{ bits/cm}^3 = 0.47 \cdot 10^{12} \approx 0.5 \cdot 10^{12}$$

The information density in the DNA molecule is $0.5 \cdot 10^{12}$ times higher than in a modern DVD!!!