

# Kvantu skaitļošana

## no Liepājas 1. vidusskolas līdz IBM

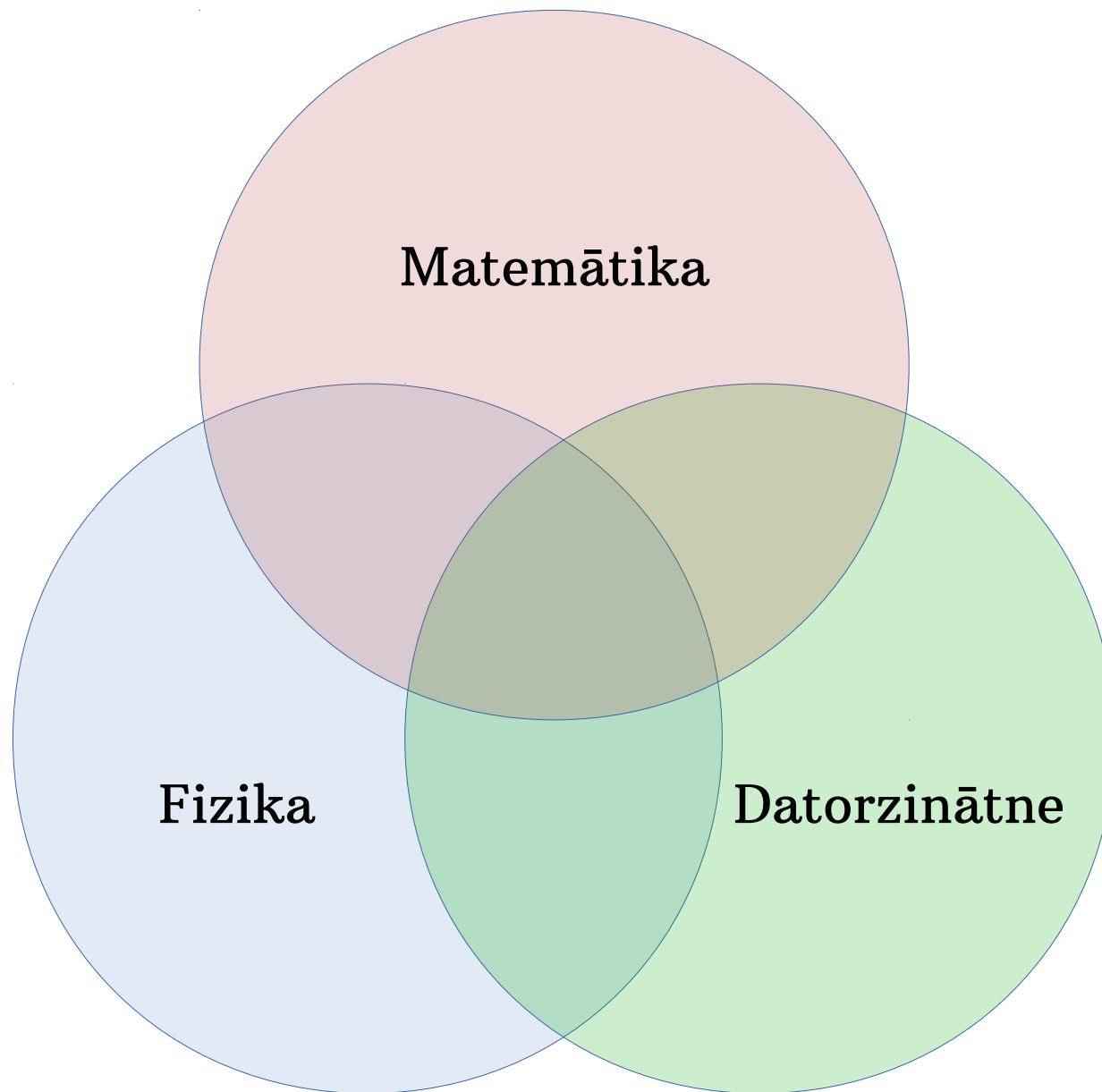


Māris Ozols  
2013

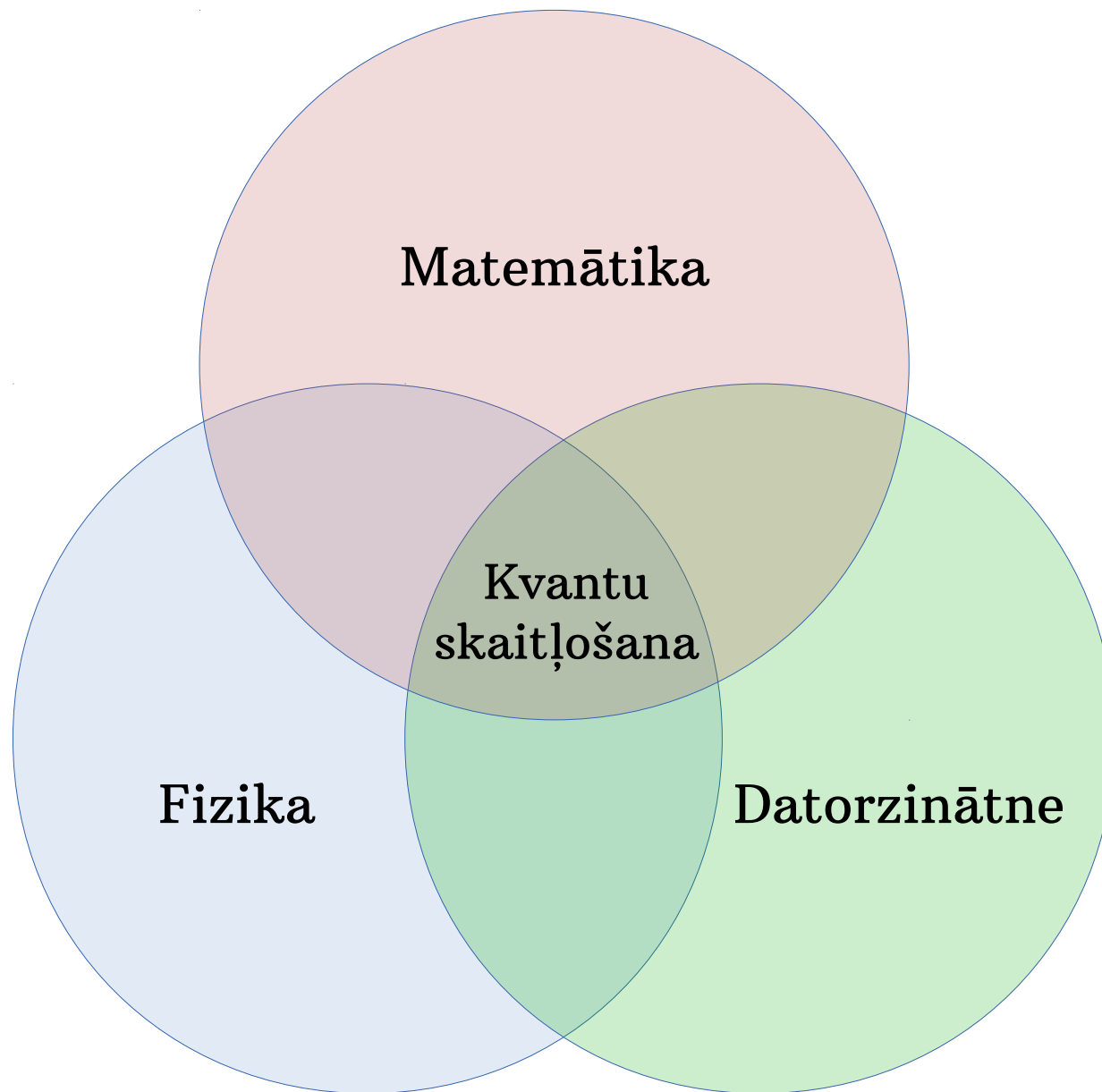


**Dzintars Jurgelaitis  
(1967–2013)**

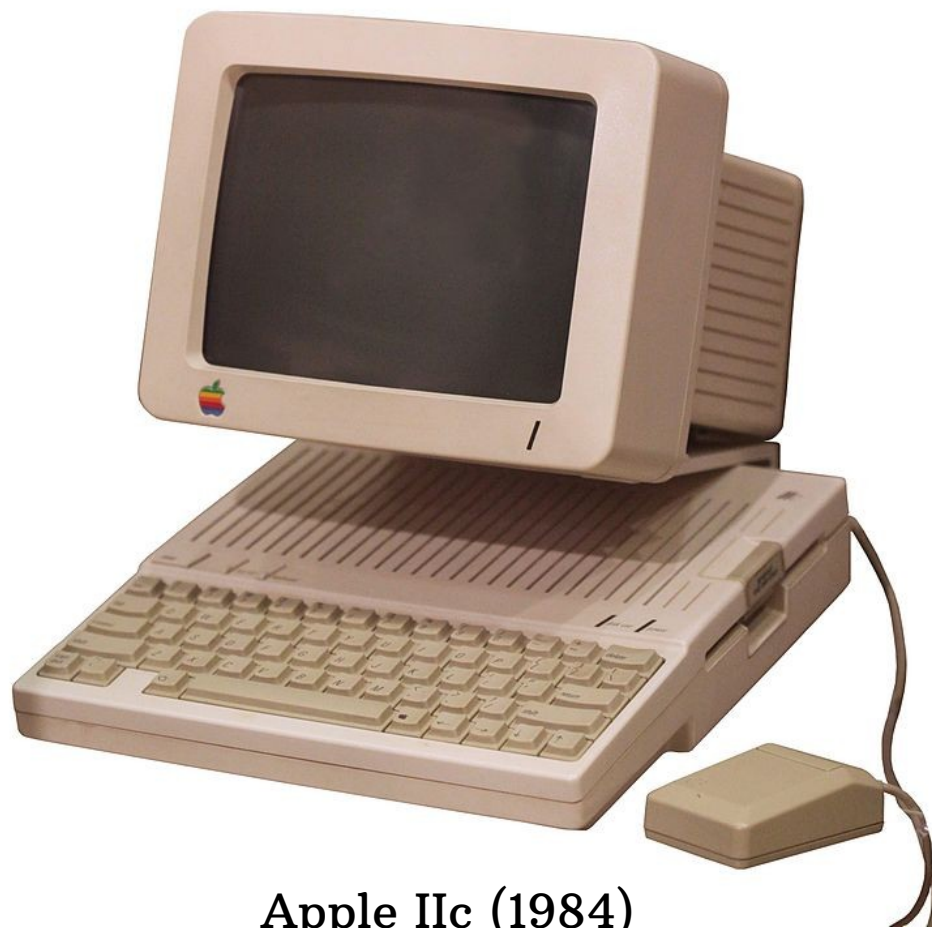
# Mans ceļš līdz kvantu skaitļošanai



# Mans ceļš līdz kvantu skaitļošanai



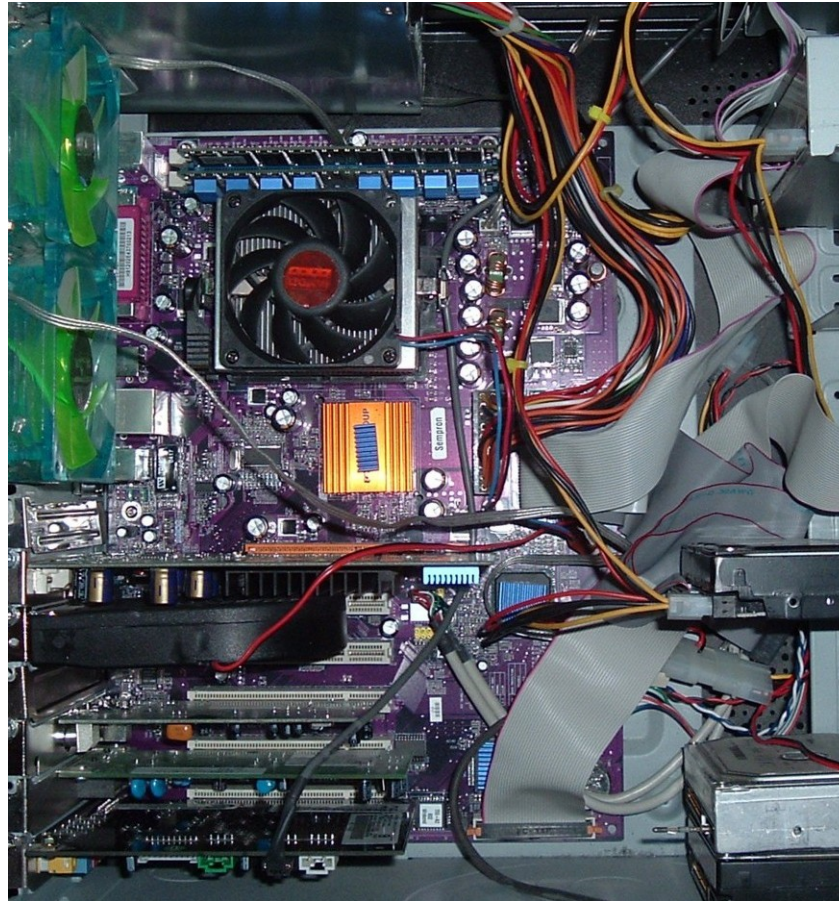
# Kas ir dators?



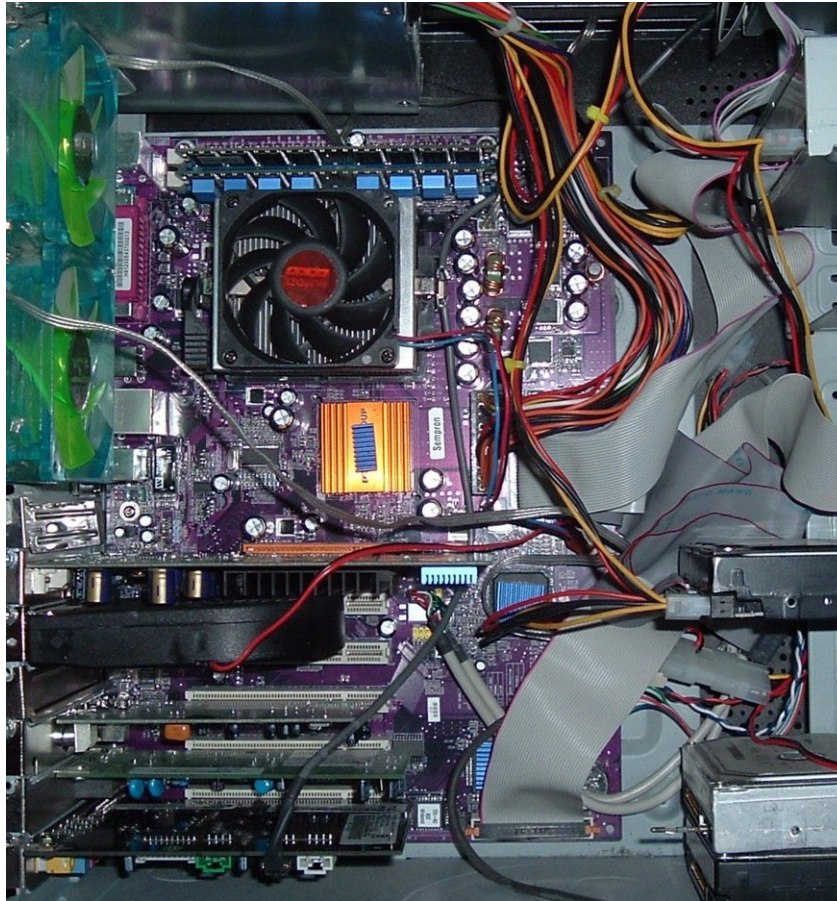
Apple IIc (1984)

Dators ir ierīce, kas apstrādā informāciju

# Kas ir dators?

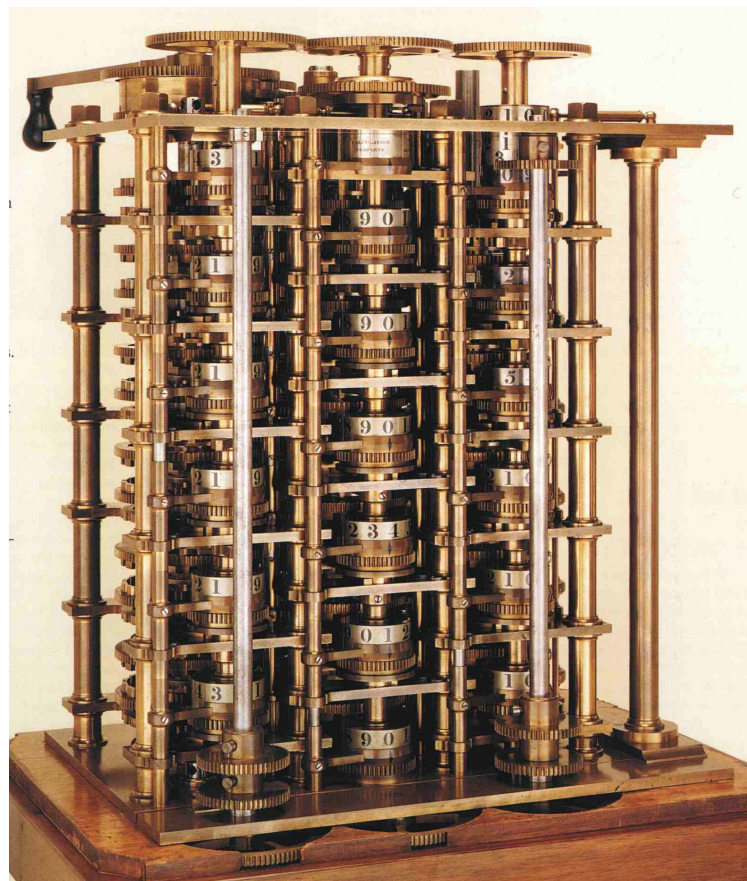


# Kas ir dators?



Tranzistori

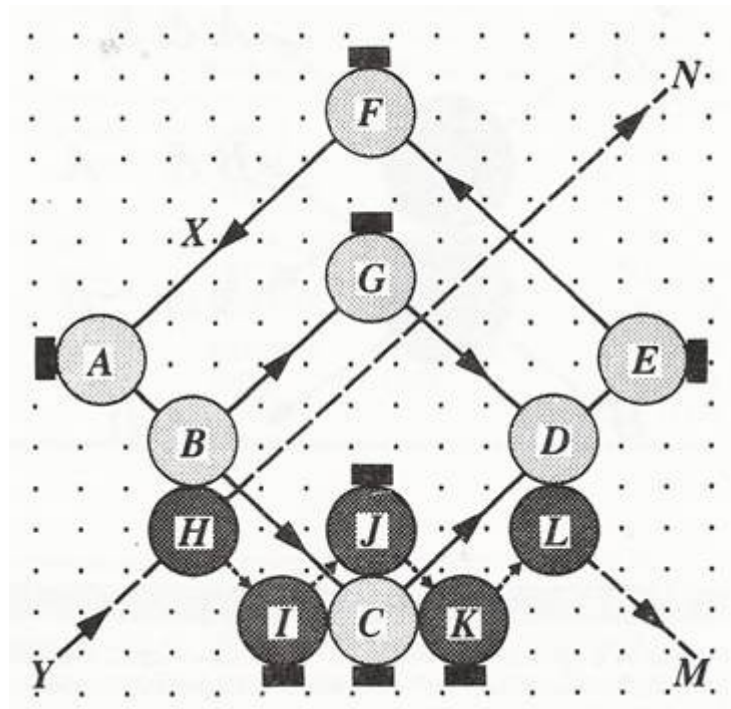
# Kas ir dators?



Analītiskā mašīna  
(pēc Čārlza Bebidža 1837. gada plāna)

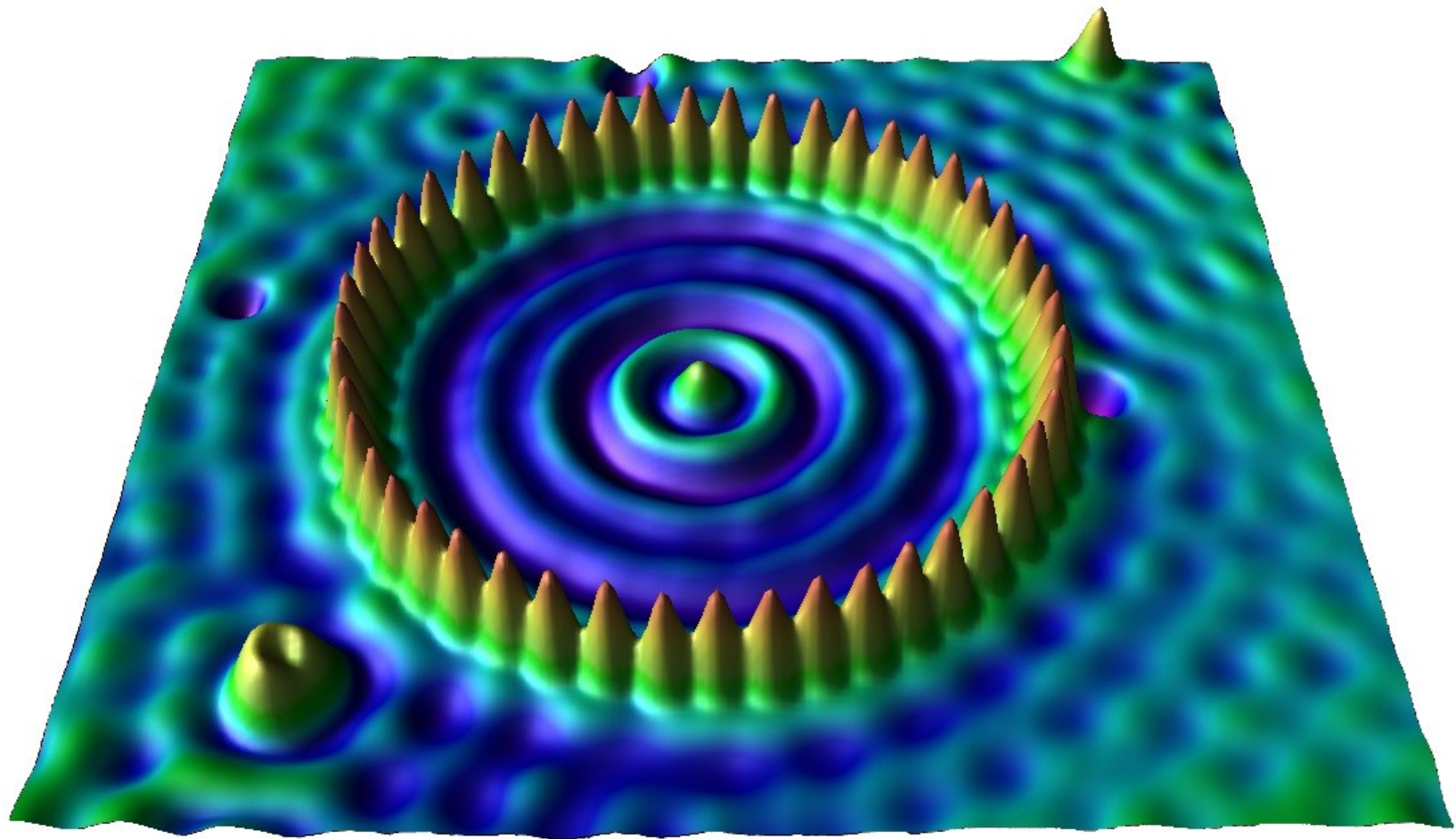


# Kas ir dators?

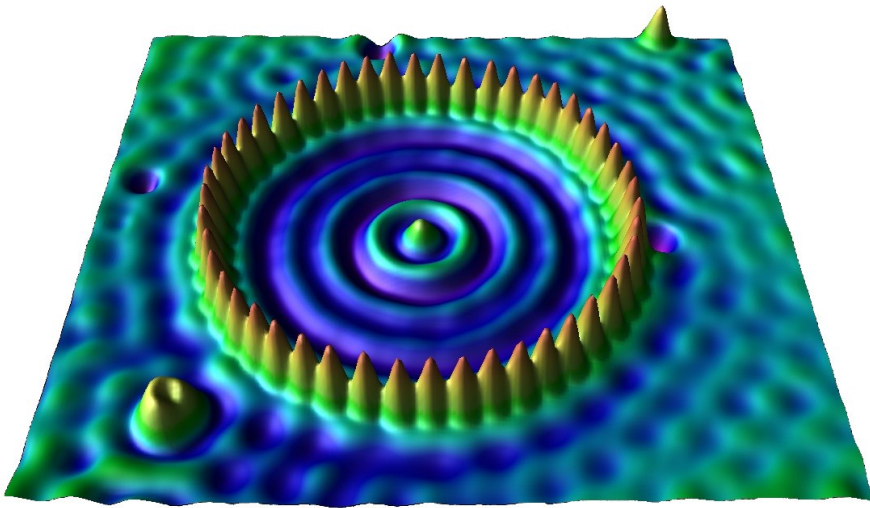


Čārlzs Benets (1988)

# Kvantu mehānika



# Kas ir kvantu dators?



Kvantu mehānika

+



Dators

Kvantu dators ir ierīce, kas apstrādā kvantu informāciju

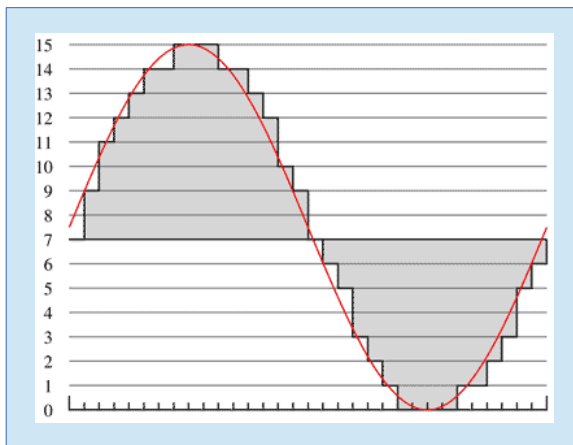
# Informācija

```
A = 01000001  
B = 01000010  
C = 01000011  
D = 01000100  
E = 01000101  
F = 01000110  
G = ...
```

Teksts



Attēls



Skana

```
0100100101101110110  
11011110111001001100  
000010110001100111  
1010001010101100...
```

**Informācija ir vieninieku  
un nulļu virkne**

# Bits



cipars

0



gerbonis

1

# Varbūtisks bits



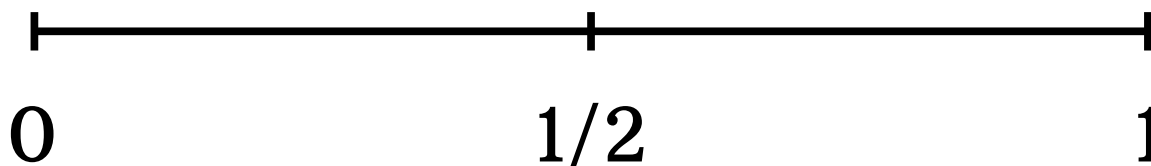
cipars



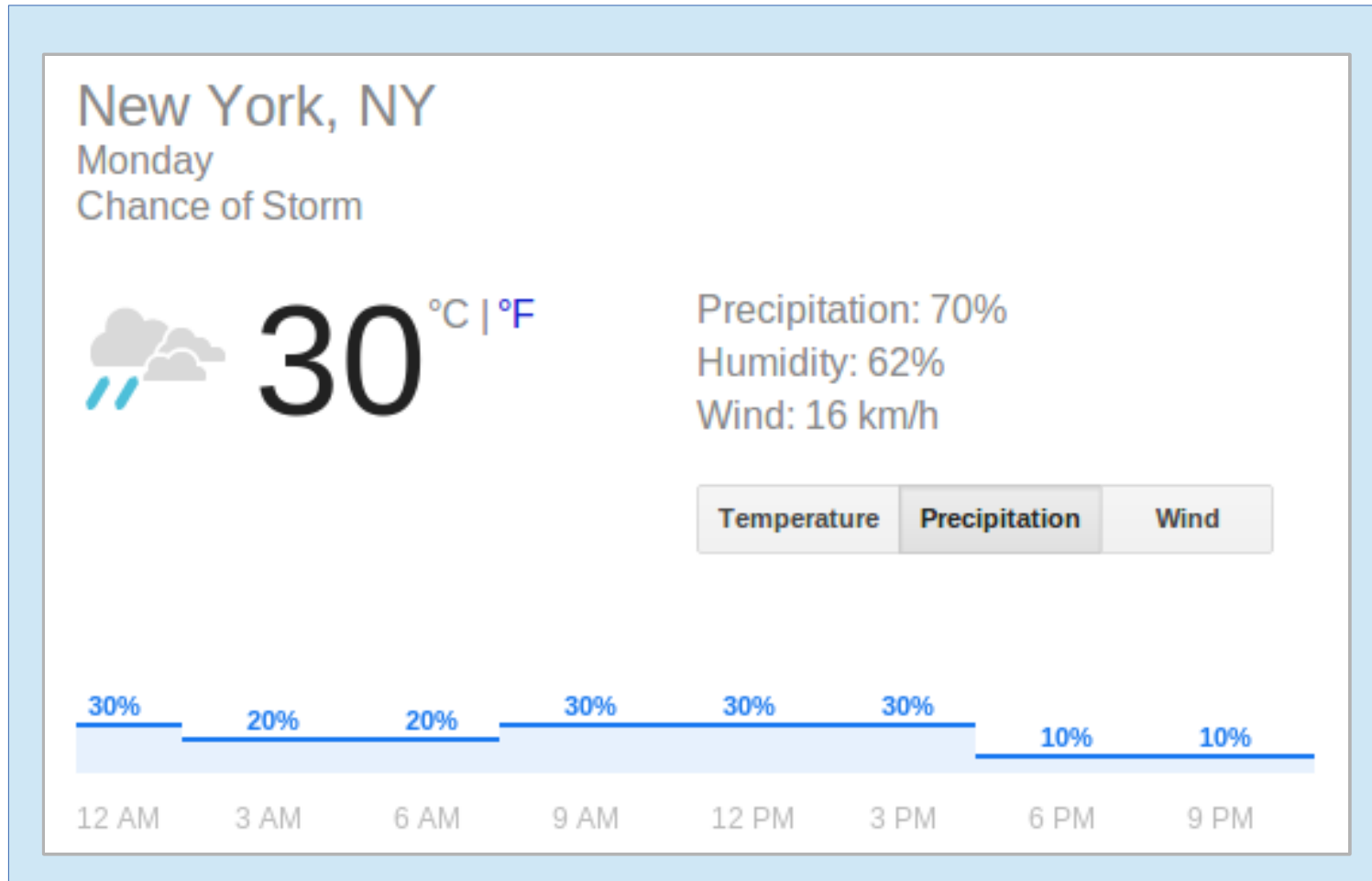
nezināms  
stāvoklis



ģerbonis



# Varbūtība



# Varbūtība kā akciju cena

2012.PRES.OBAMA

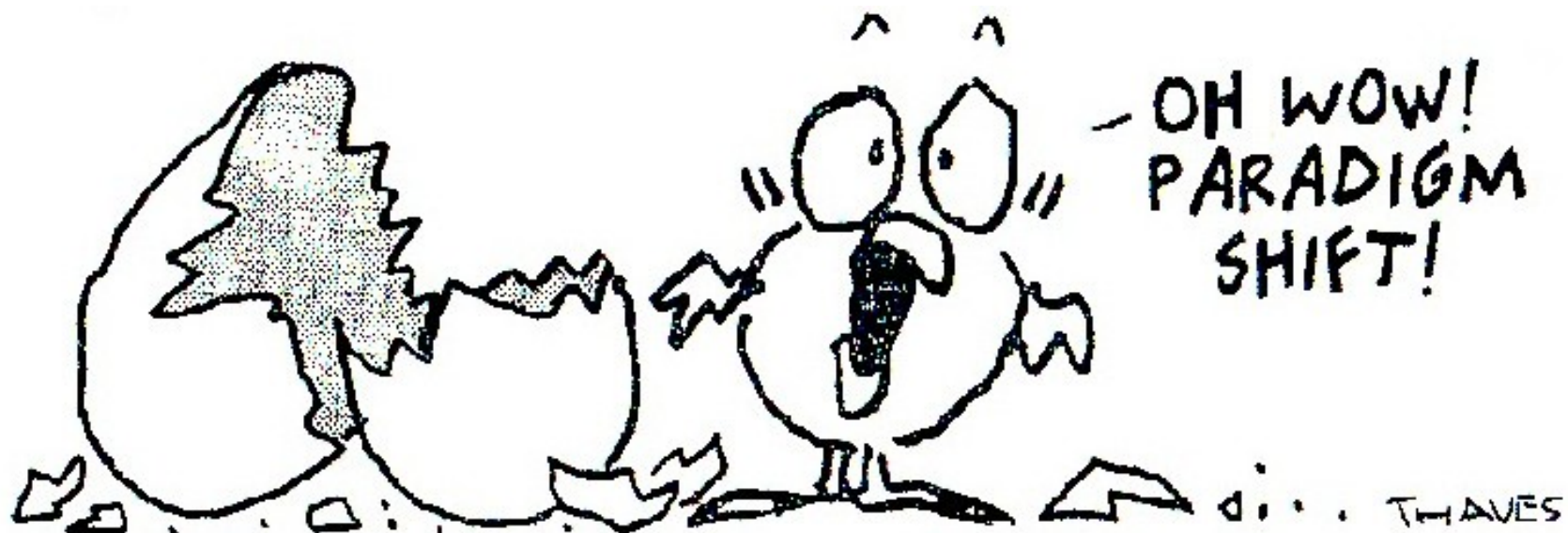
Dec 06, 2010 - Nov 07, 2012



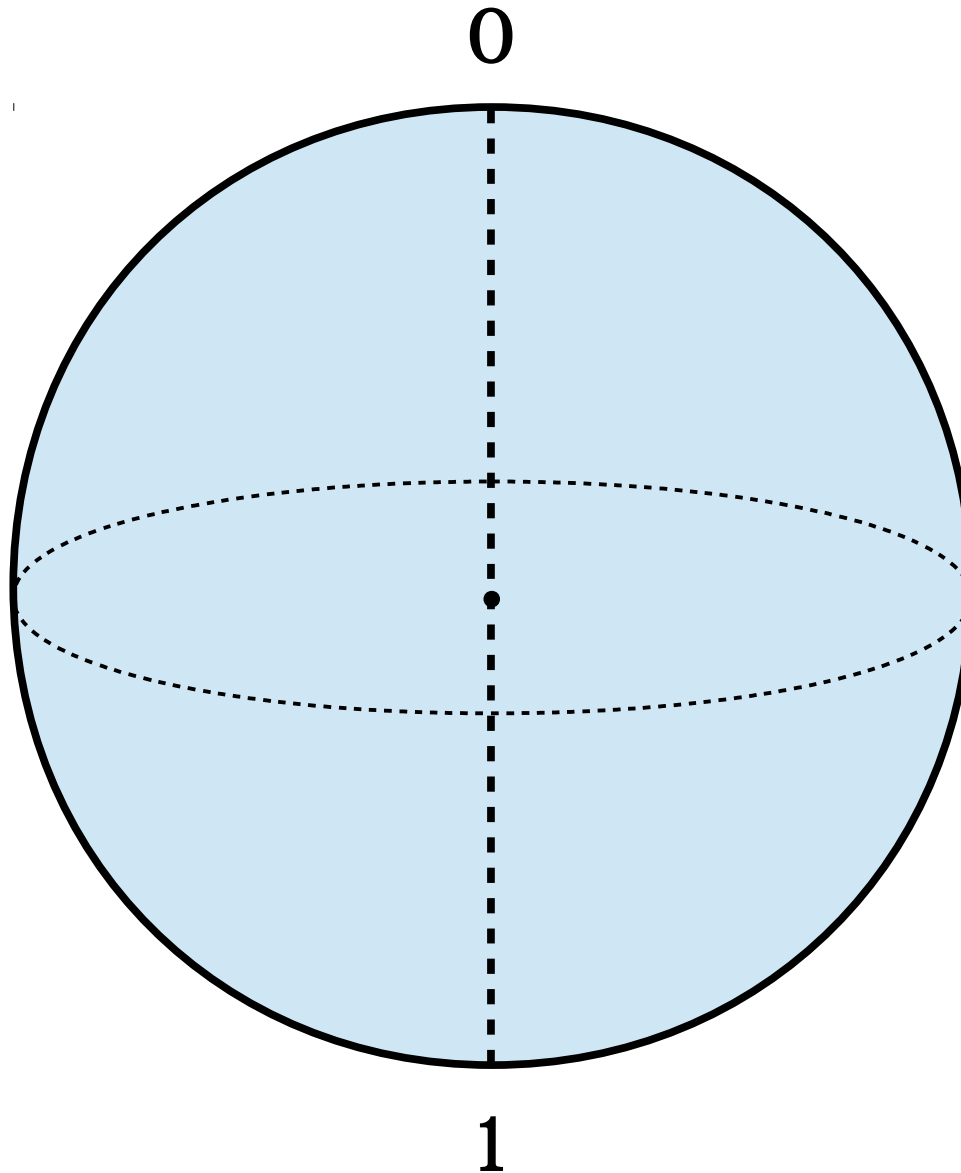
Varbūtība, ka Baraks Obama tiks atkārtoti ievēlēts  
par ASV prezidentu 2012 gadā



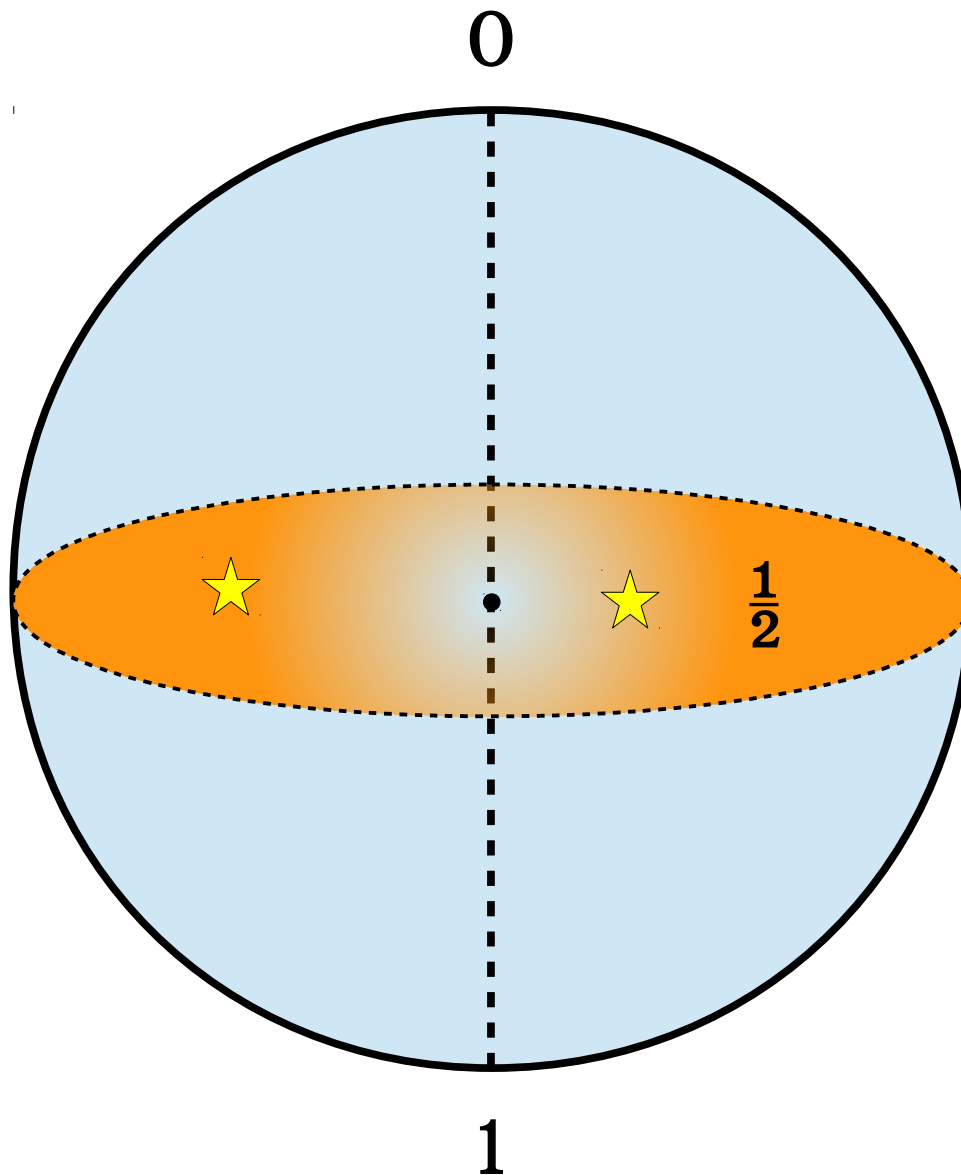
# Kvantu informācija?



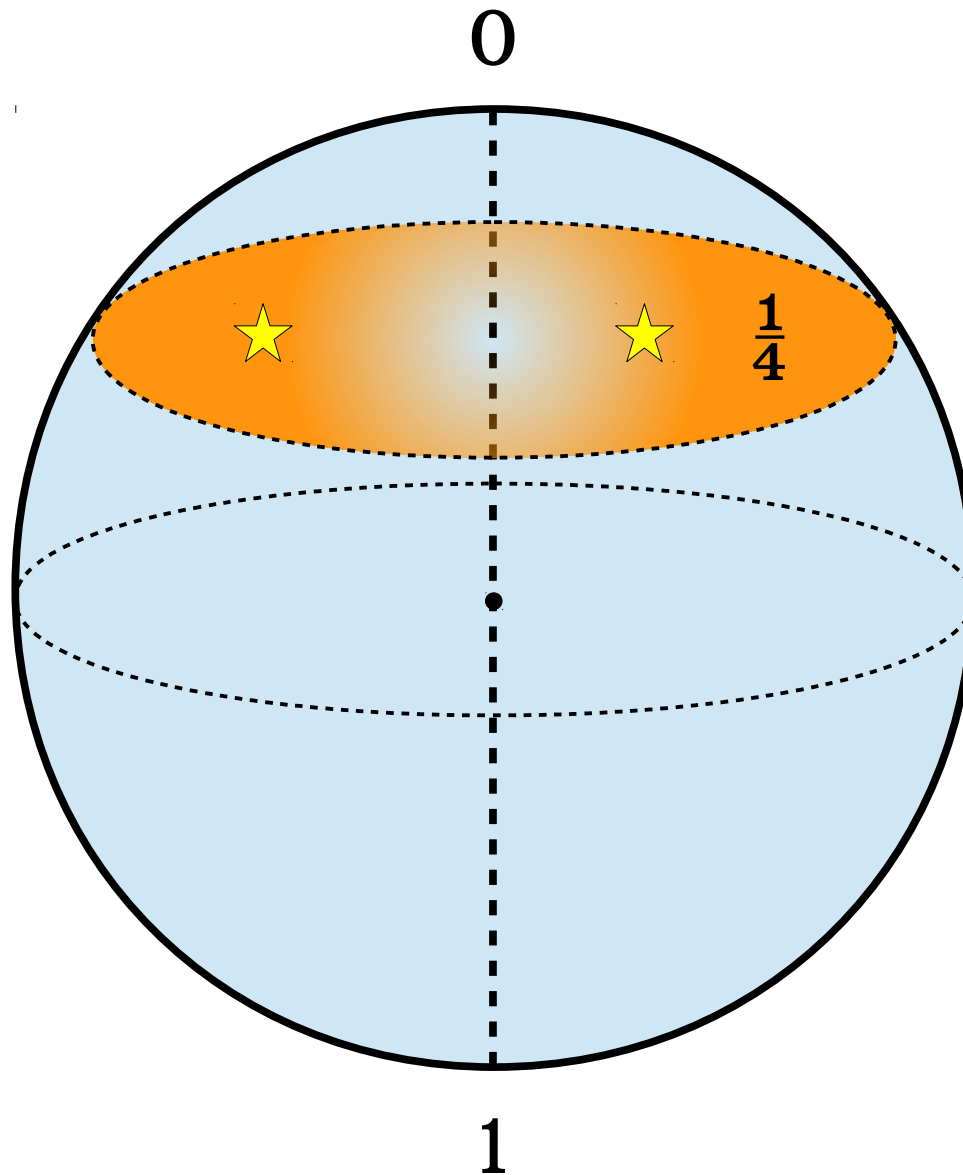
# Kvantu monēta



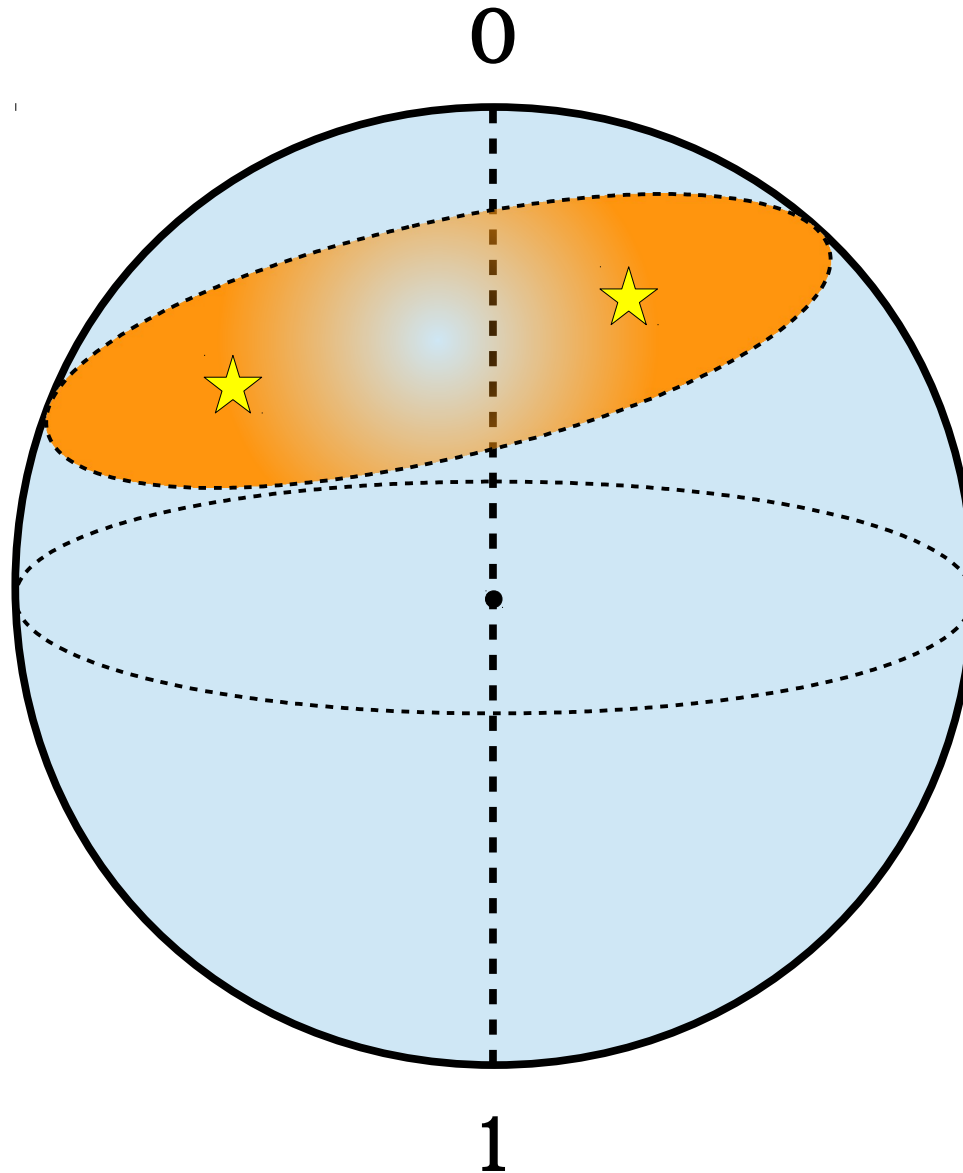
# Kvantu monēta



# Kvantu monēta



# Kvantu monēta



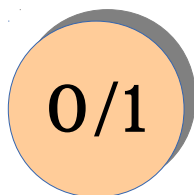
# Kriptogrāfija



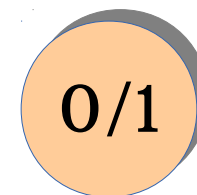
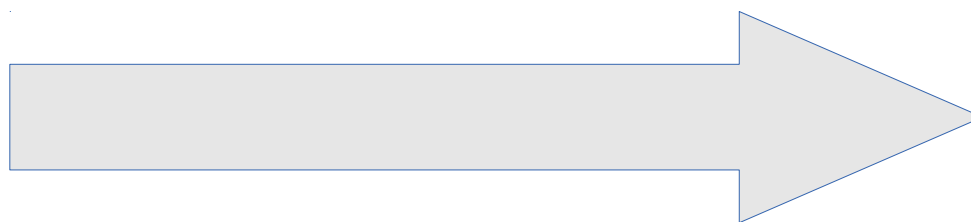
Eduards  
Sniegamiga



Džuliana  
Asānaža



Slepena  
ziņa



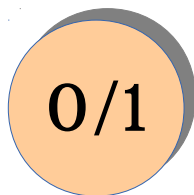
# Kriptogrāfija



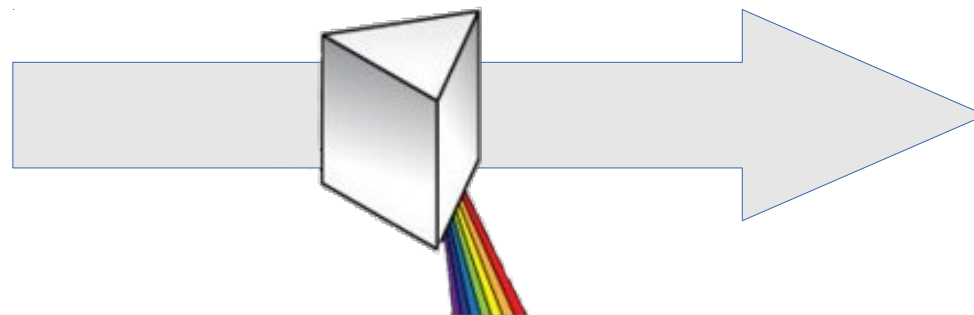
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Sniegamiga



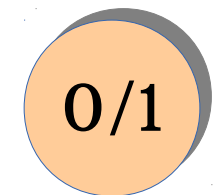
Džuliana  
Asānaža



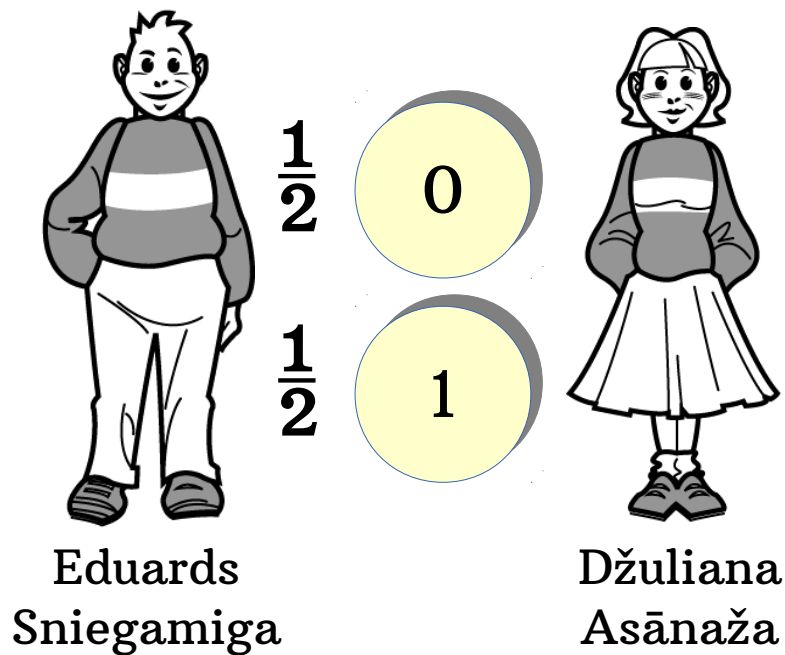
Slepena  
ziņa



LBA  
(Lielā Brāļa Aģentūra)



# Kriptogrāfija

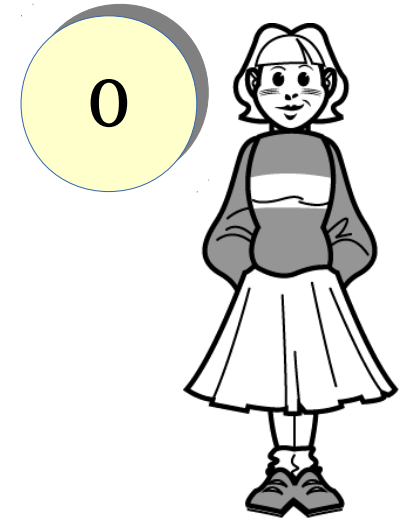
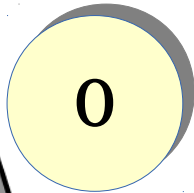




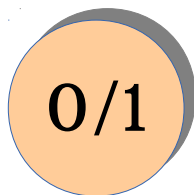
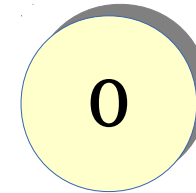
# Kriptogrāfija



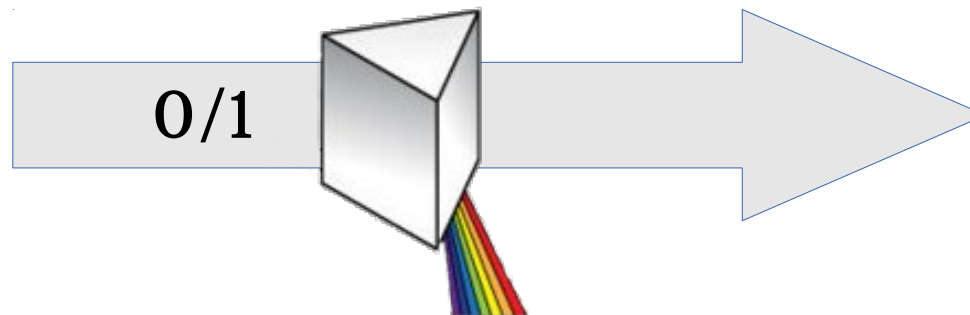
Eduards  
Sniegamiga



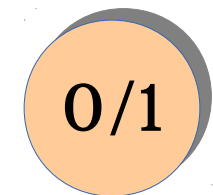
Džuliana  
Asānaža



Slepena  
ziņa



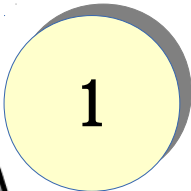
LBA  
(Lielā Brāļa Aģentūra)



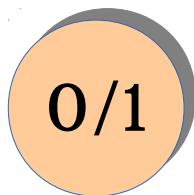
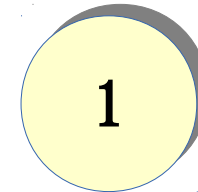
# Kriptogrāfija



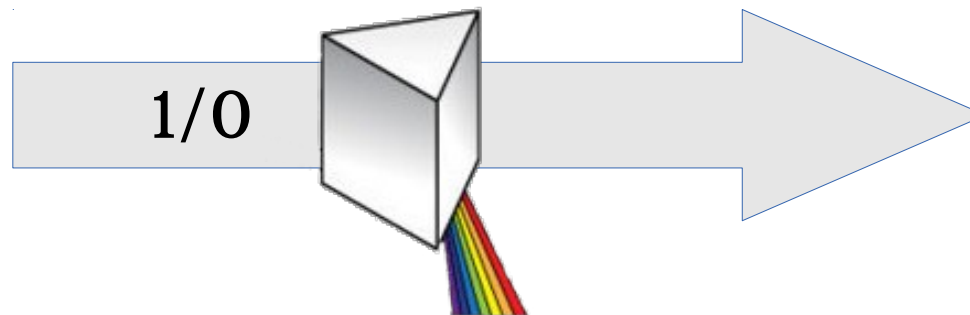
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Sniegamiga



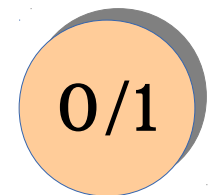
Džuliana  
Asānaža



Slepena  
ziņa



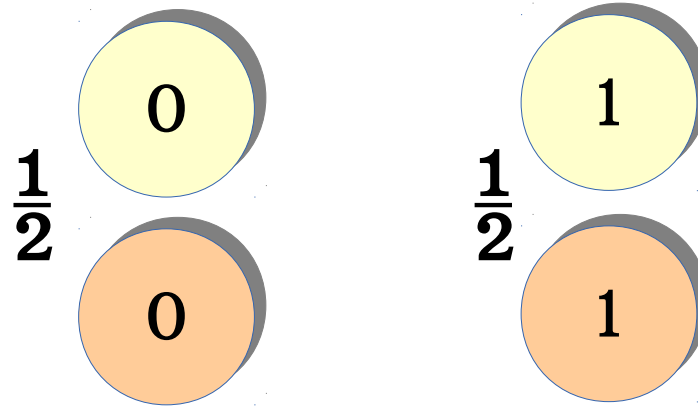
LBA  
(Lielā Brāļa Aģentūra)



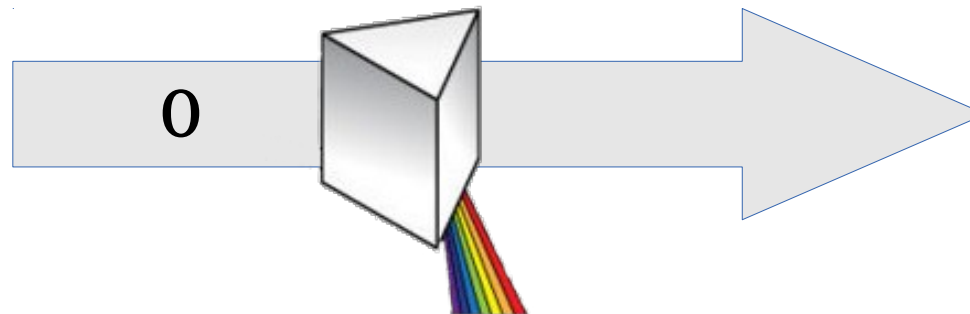
# Kriptogrāfija



Eduards  
Sniegamiga



Džuliana  
Asānaža

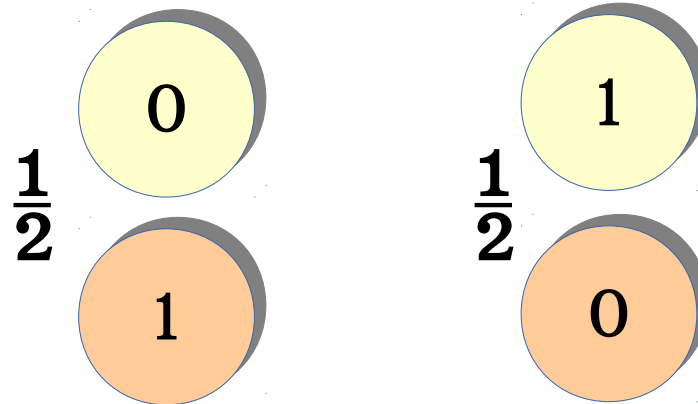


LBA  
(Lielā Brāļa Aģentūra)

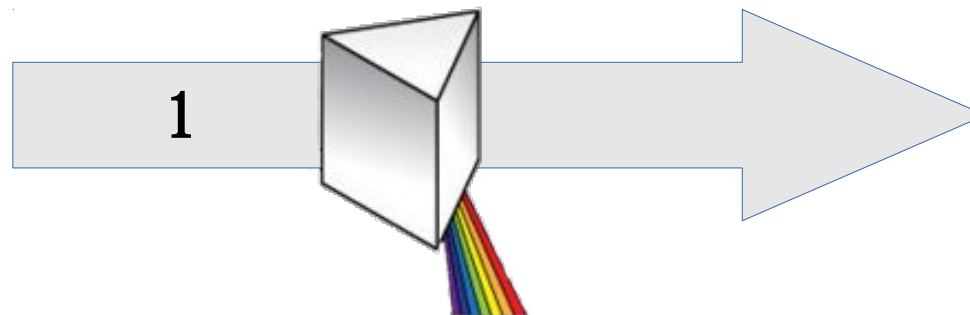
# Kriptogrāfija



Eduards  
Sniegamiga



Džuliana  
Asānaža



LBA  
(Lielā Brāļa Aģentūra)

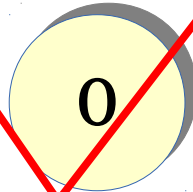
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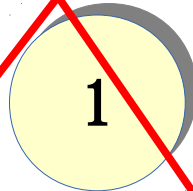
Eduards  
Sniegamiga

Šeremetjevas  
Lidosta  
Maskavā

~~1/2~~



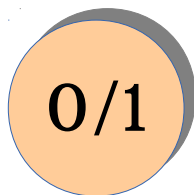
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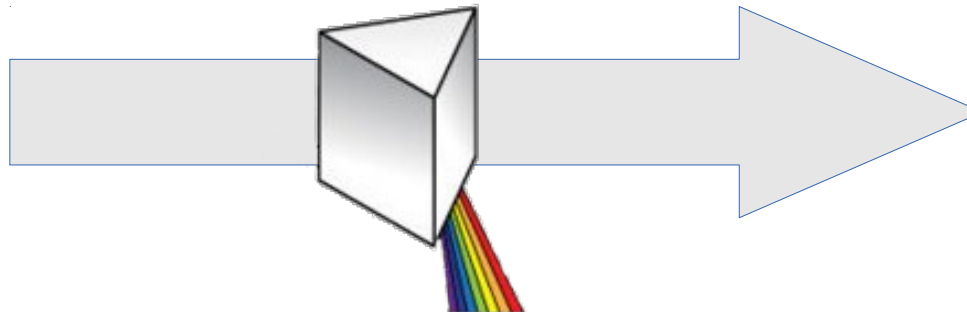
Ekvadoras  
vēstniecība  
Londonā



Džuliana  
Asānaža

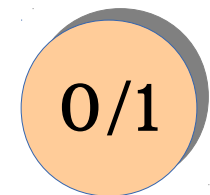


Slepena  
ziņa

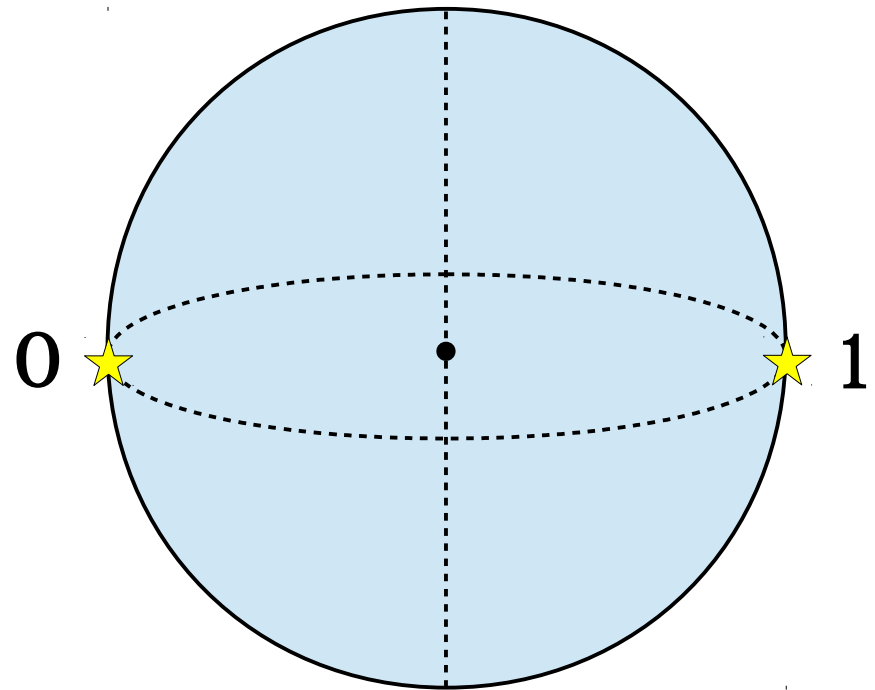
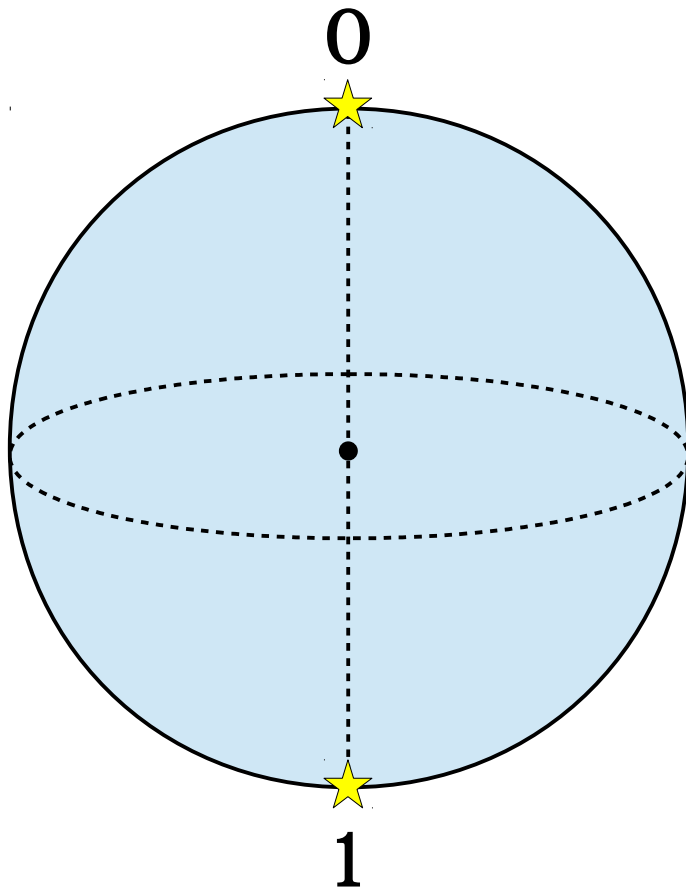


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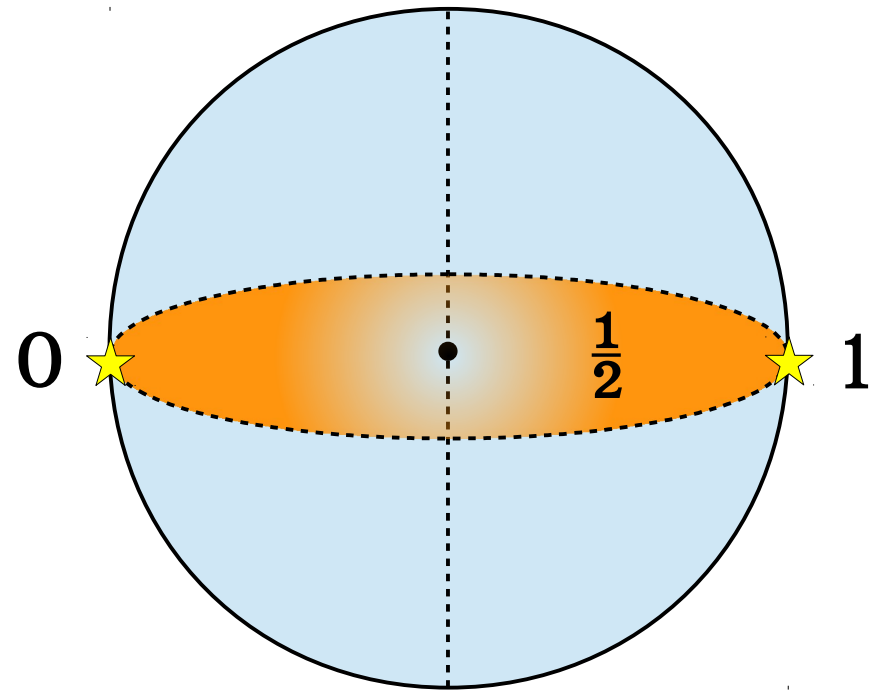
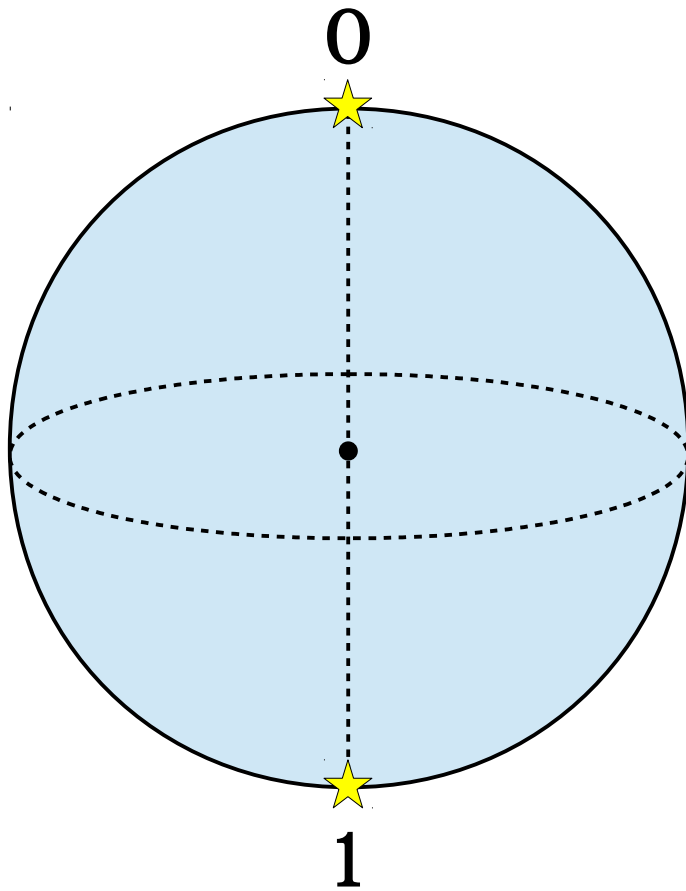
(Lielā Brāļa Aģentūra)



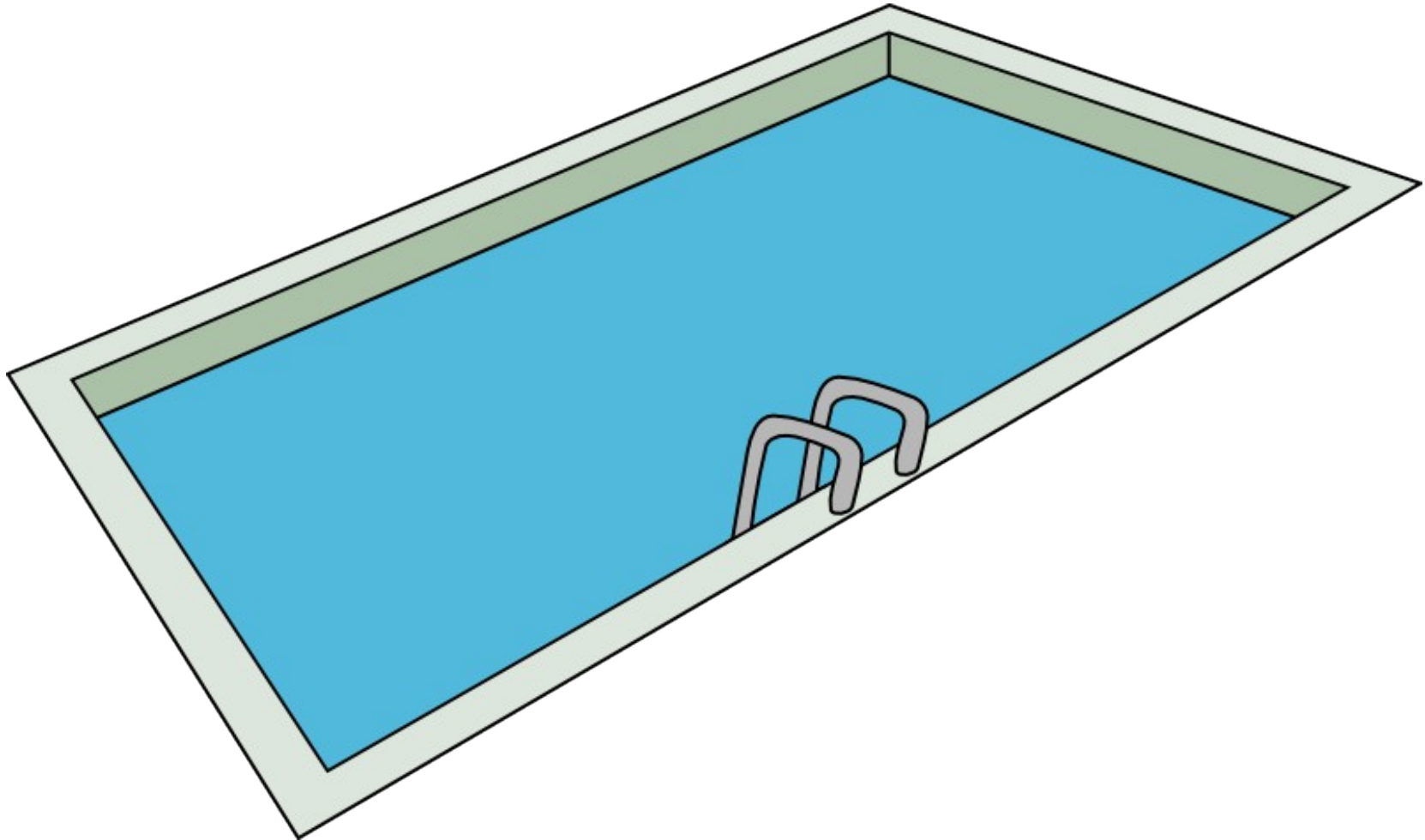
# Kvantu kriptogrāfija



# Kvantu kriptogrāfija

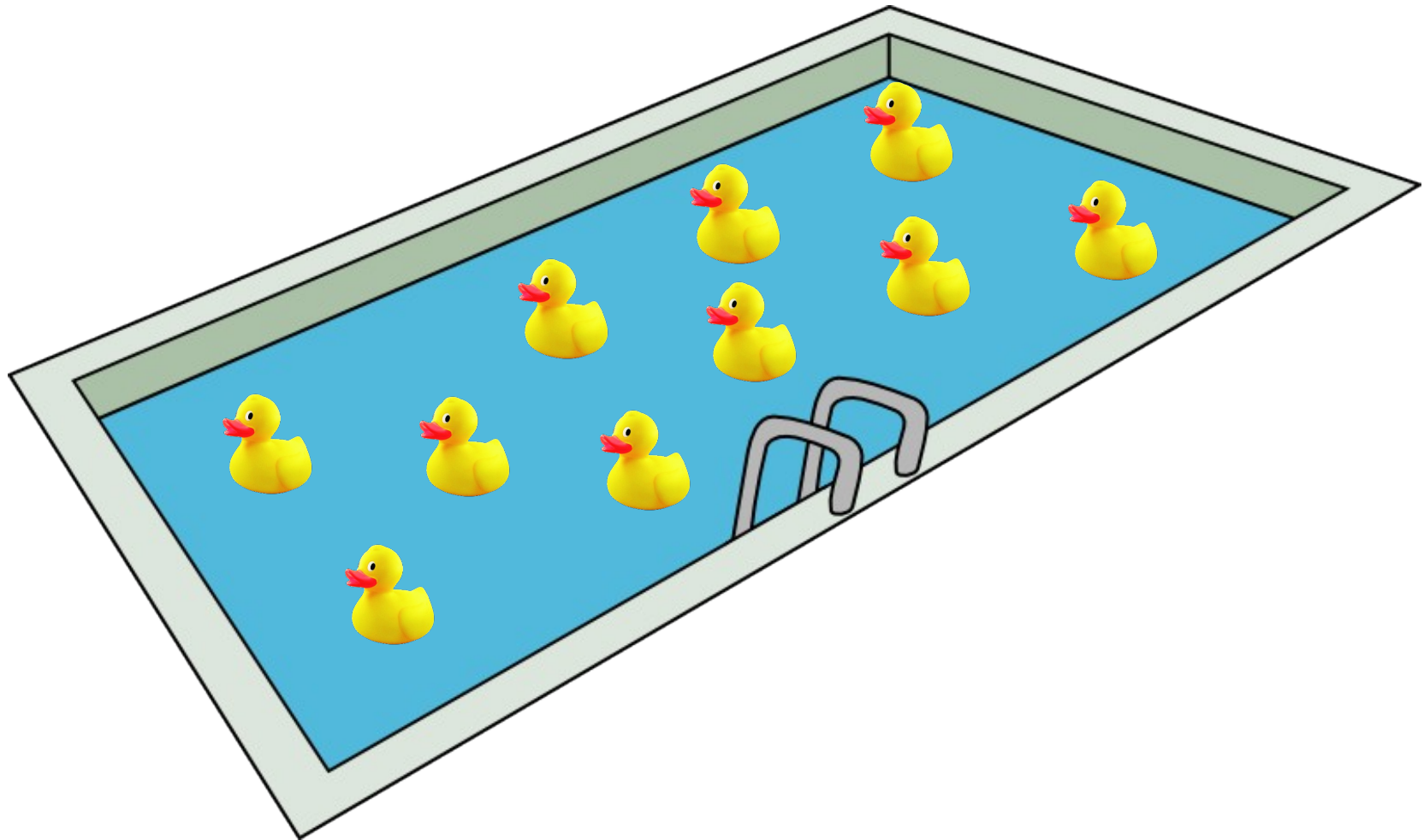


# Kvantu algoritmi

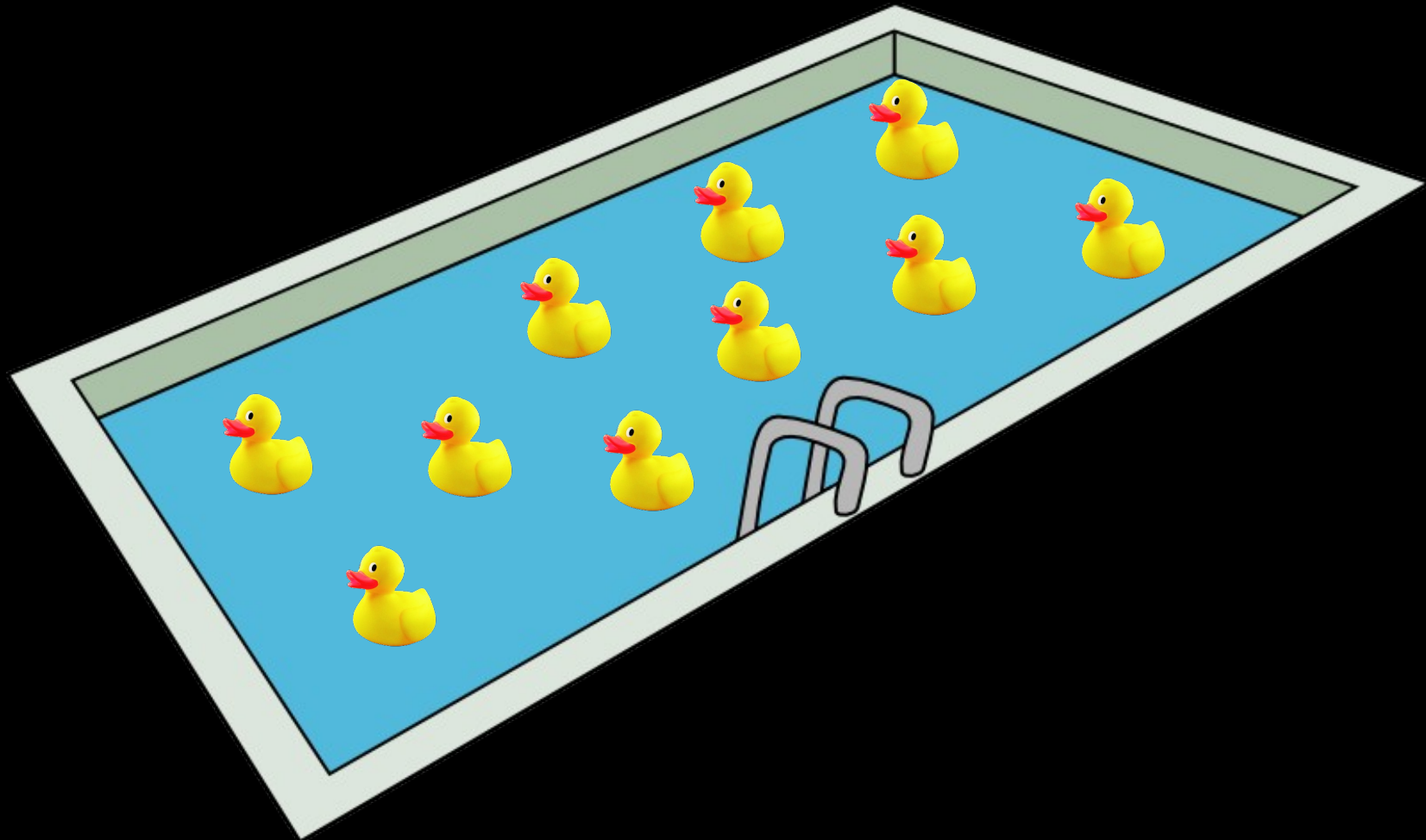




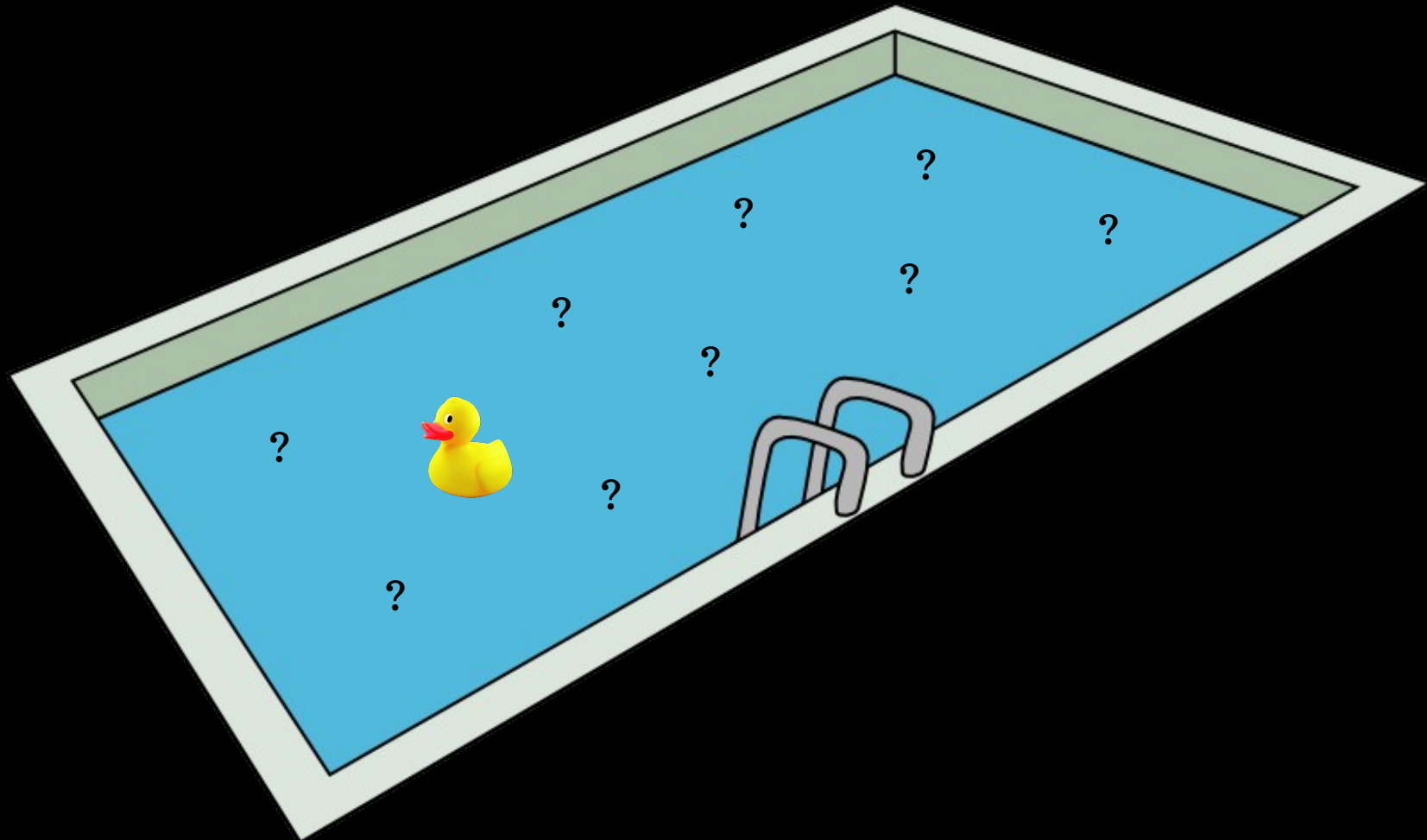
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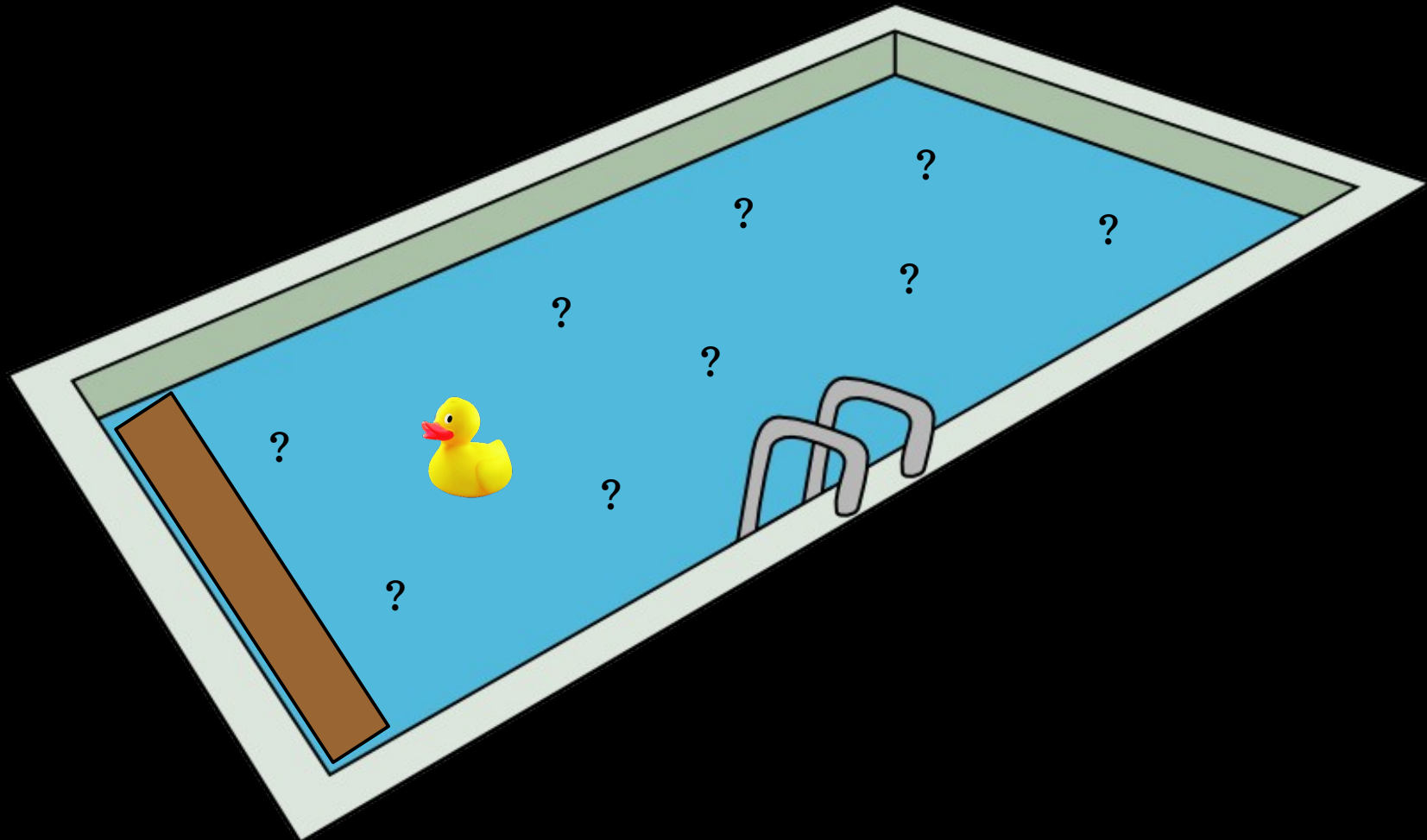
# Kvantu algoritmi



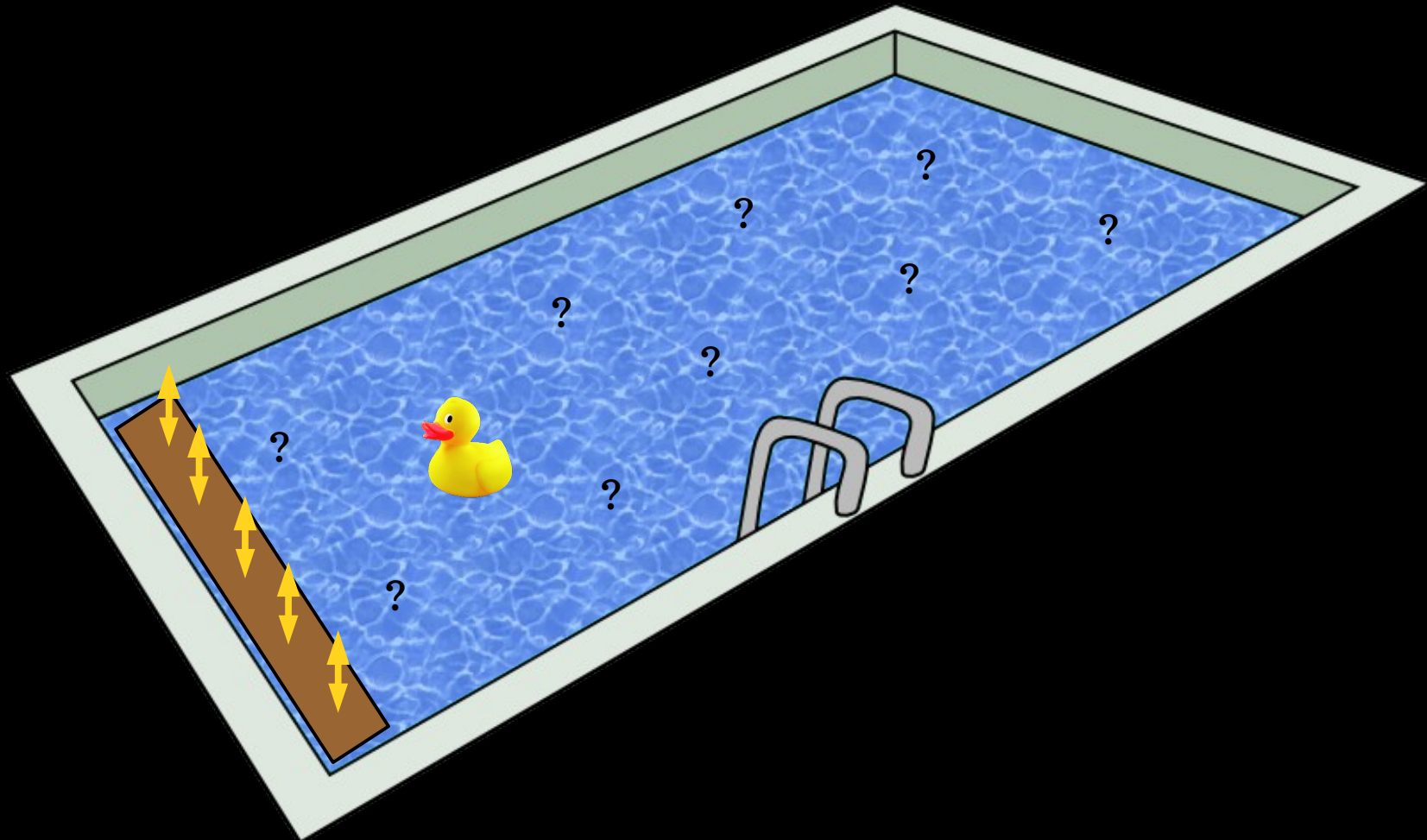
# Kvantu meklēšanas algoritms



# Kvantu meklēšanas algoritms



# Kvantu meklēšanas algoritms



# Nākotne?

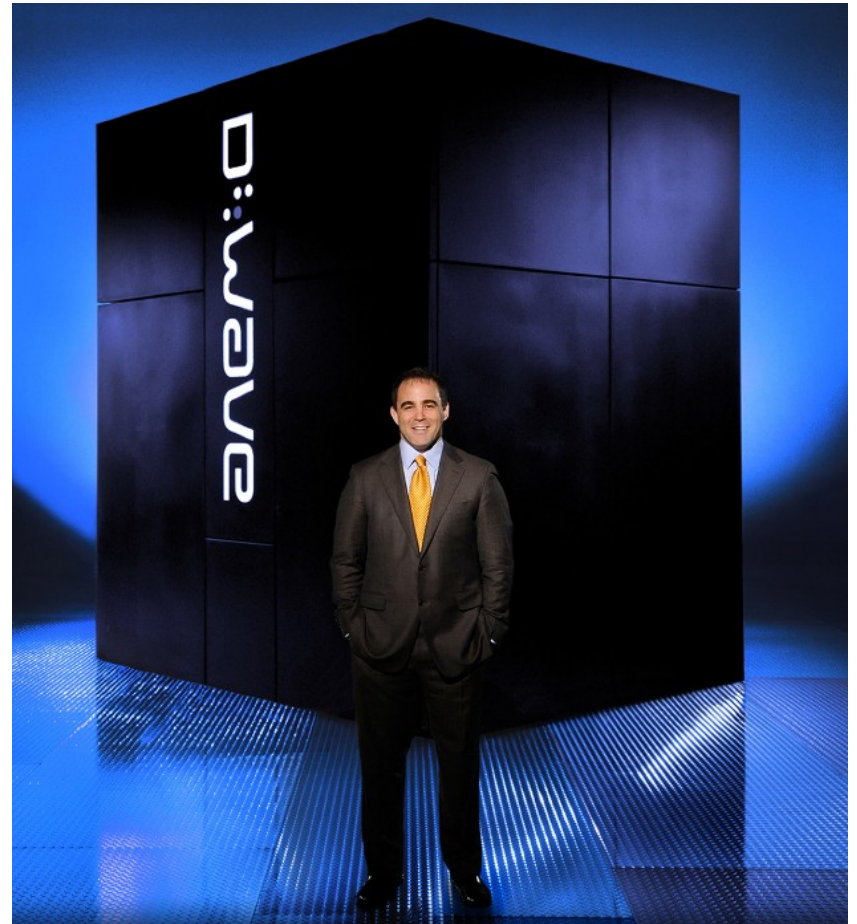


iPhone 5 (2012)

# Progress



ENIAC (1946)



D-Wave One (2012)



VIJAS  
RSITA

19



# Paldies!

## Liepājas 1. vidusskola

- Zenta Dobele
- Dzintars Jurgelaitis
- Austris Krauja
- Helvijs Valcis

## Āgenskalna Valsts Ģimnāzija

- Aivars Ančupāns
- Jānis Krūmiņš

## Latvijas Universitāte

- Andris Ambainis
- Agnis Andžāns
- Andrejs Cēbers
- Vilnis Detlavs
- Vjačeslavs Kaščejevs
- Rūsiņš Freivalds
- Juris Smotrovs
- Aleksandrs Šostaks

## University of Waterloo

- Andrew Childs
- Debbie Leung

## Finansiālais atbalsts

- Vītolu Fonds un Statoil
- Jaunā Akadēmija

