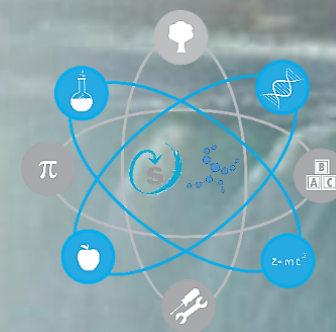


3. konferenca učiteljev naravoslovnih predmetov  
Povezujemo znanje za boljšo pismenost & Scientix

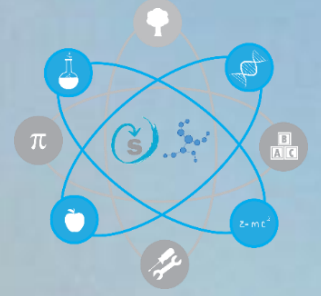
# Kako nastane mavrica

Jurij Bajc

Pedagoška fakulteta, Univerza v Ljubljani

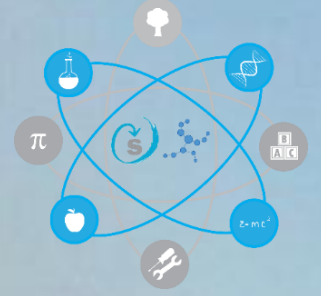


# O čem bi lahko govorili



- značilnosti mavrice
- razlaga značilnosti
  - geometrijska optika
  - valovna optika
- fizikalne osnove
  - lom, odboj
  - razklon bele svetlobe v barve, disperzija
  - prepustnost, odbojnost, polarizacija
  - interferenca, uklon

# O čem bomo govorili

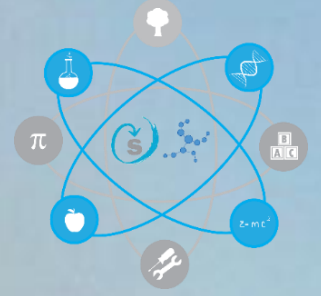


- značilnosti mavrice
- razlaga značilnosti
  - geometrijska optika
- fizikalne osnove
  - lom, odboj
  - razklon bele svetlobe v barve, disperzija

# Kaj je mavrica

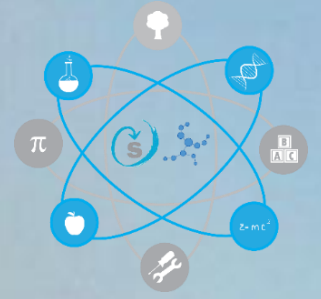


# Kaj je mavrica

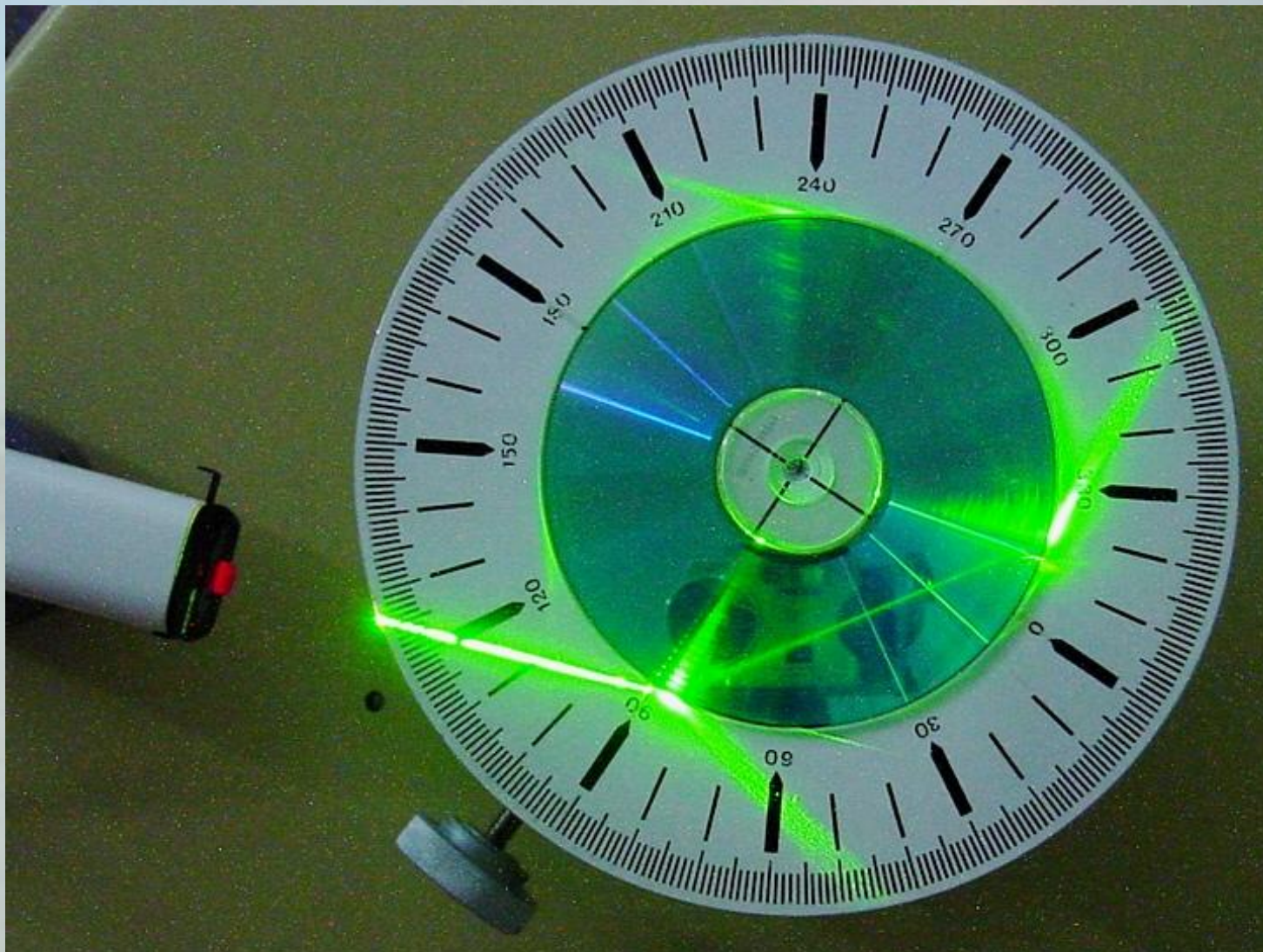
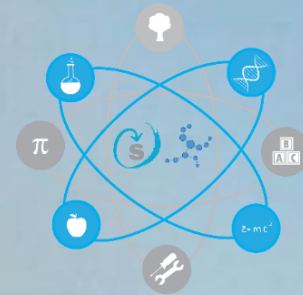




# Kaj je mavrica

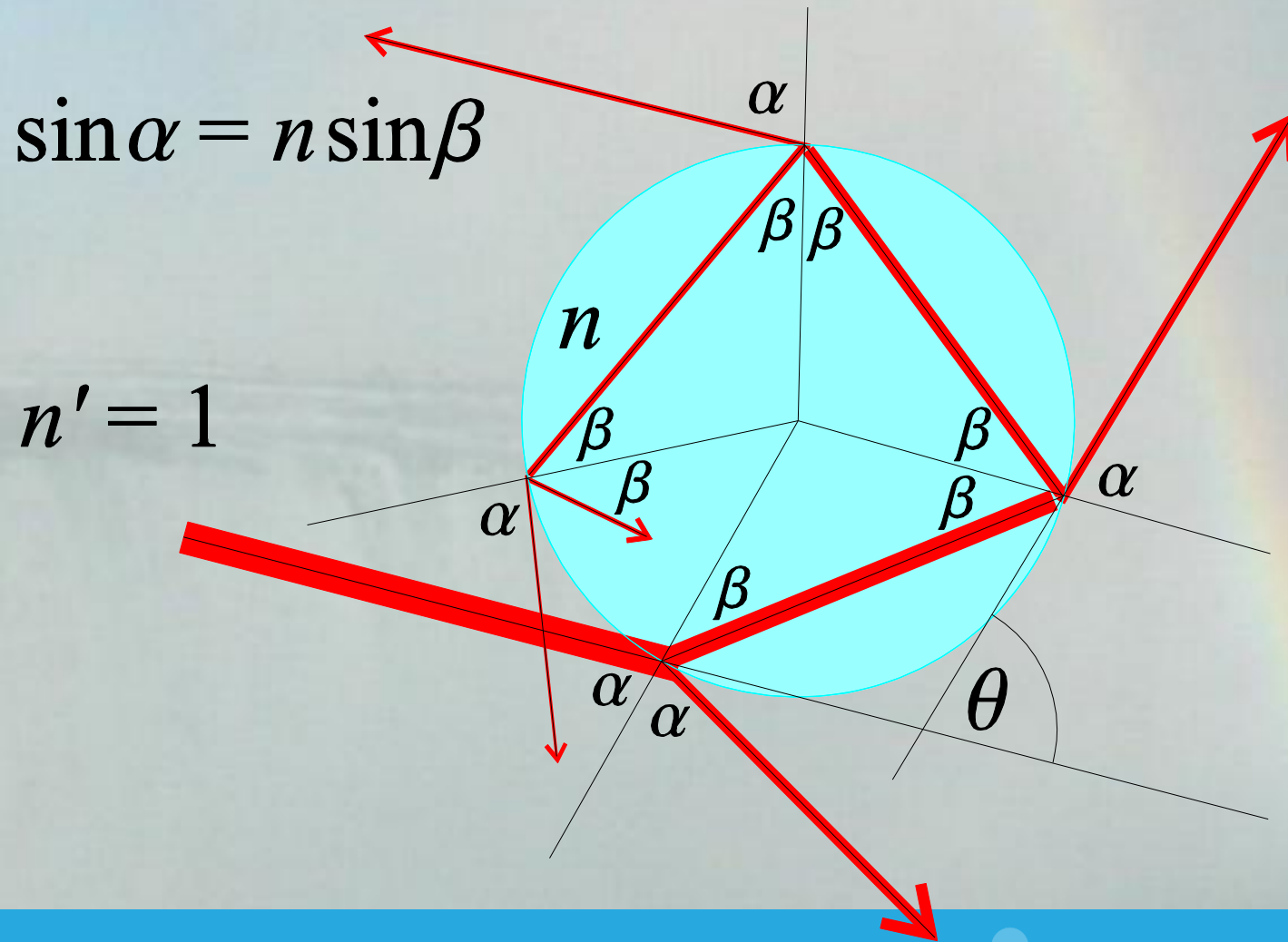
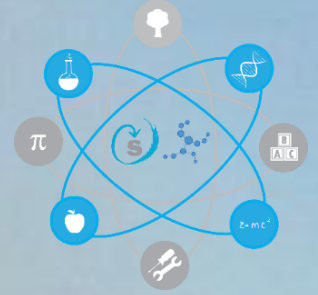


# Dogajanje v kapljici vode



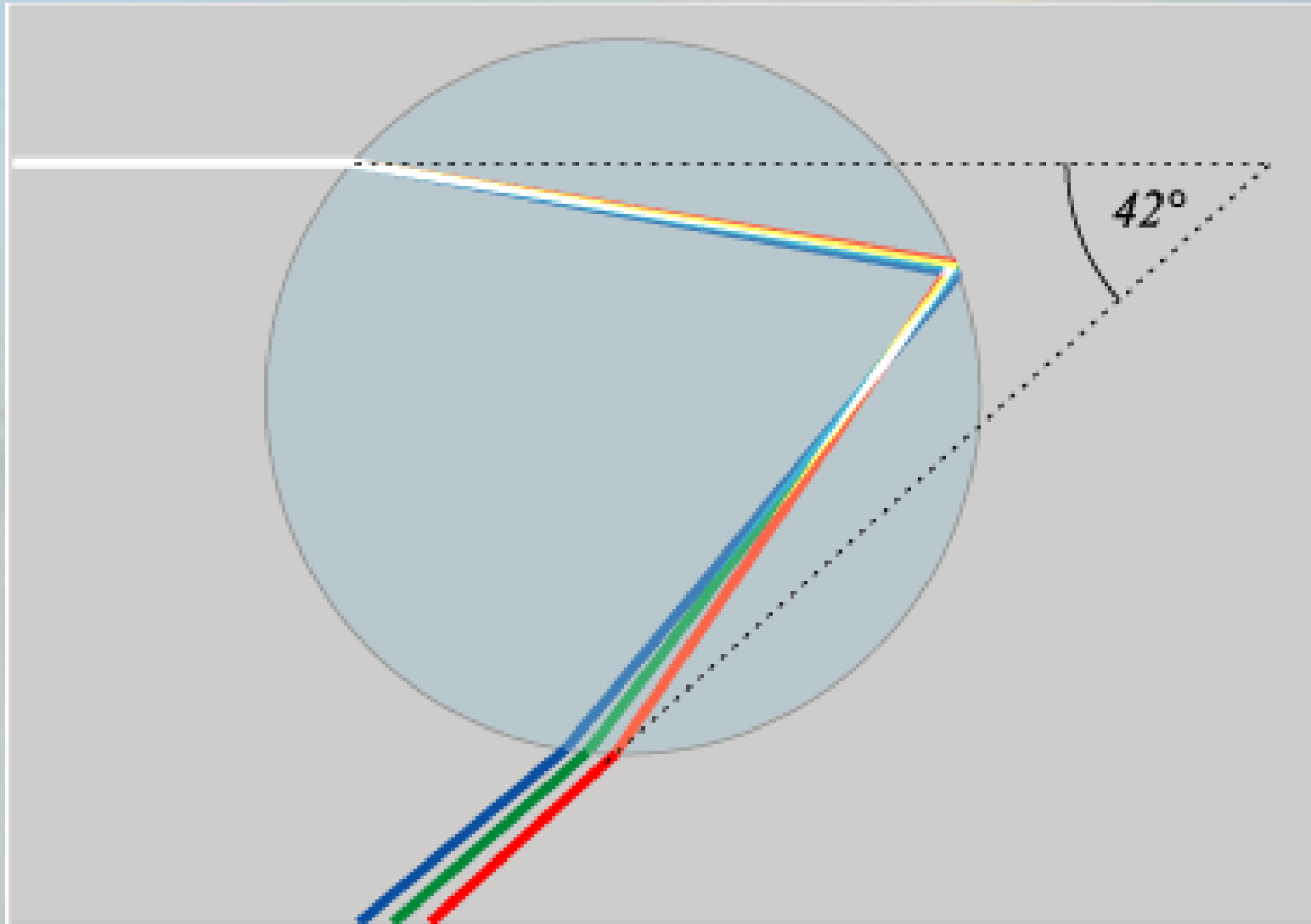
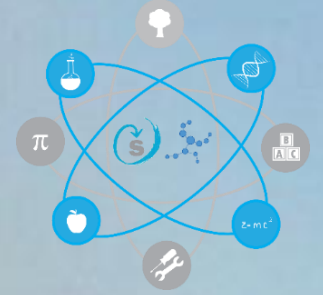


# Dogajanje v kapljici vode

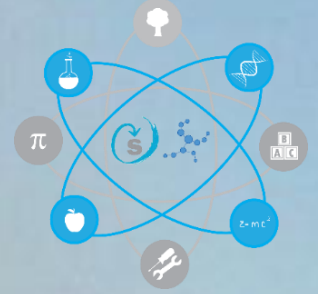




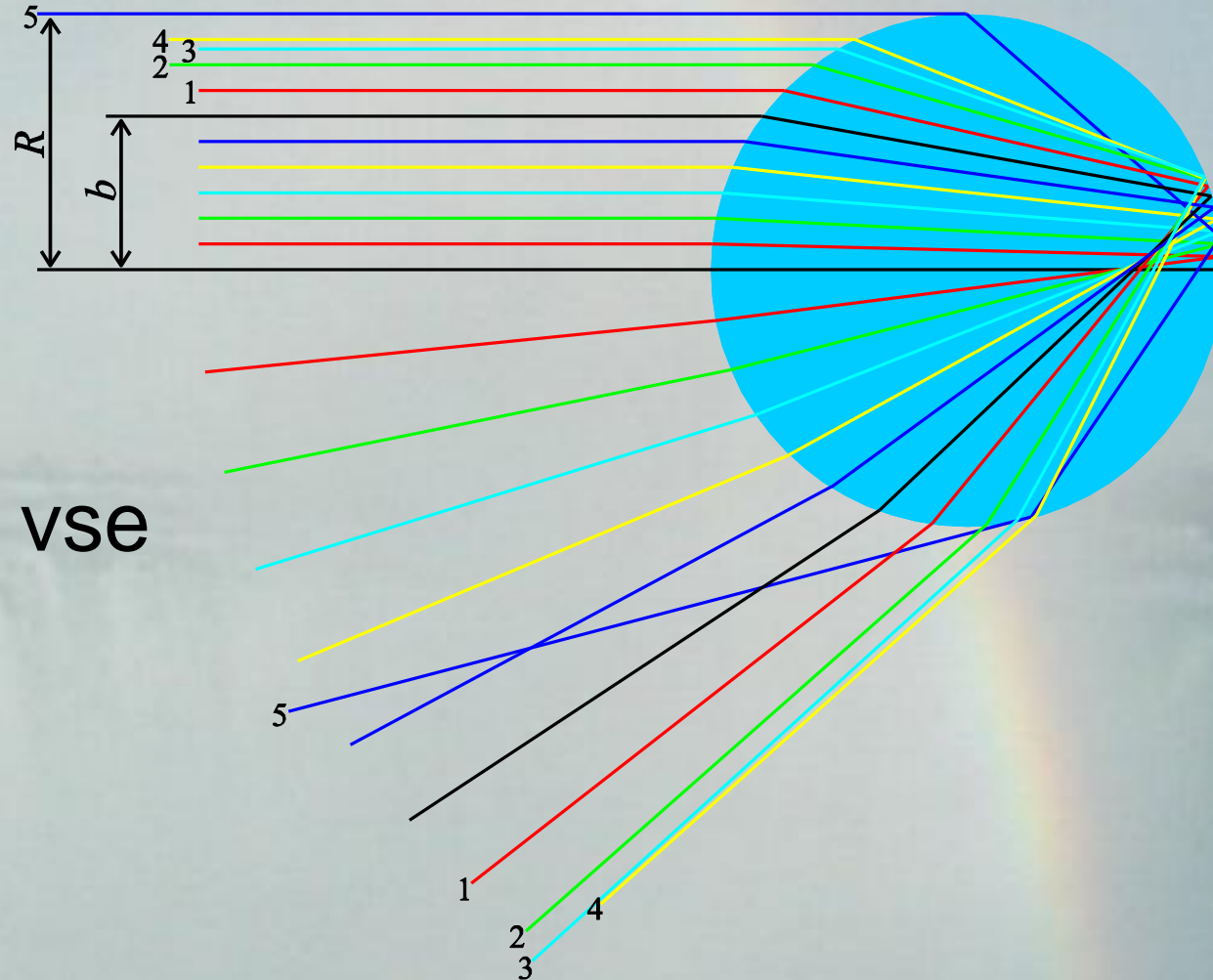
# Dogajanje v kapljici vode



# Kako nastane mavrica



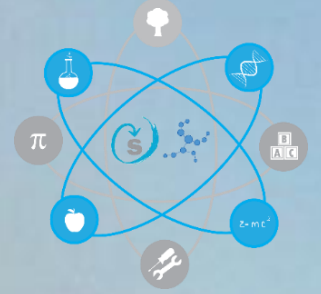
- potek žarkov



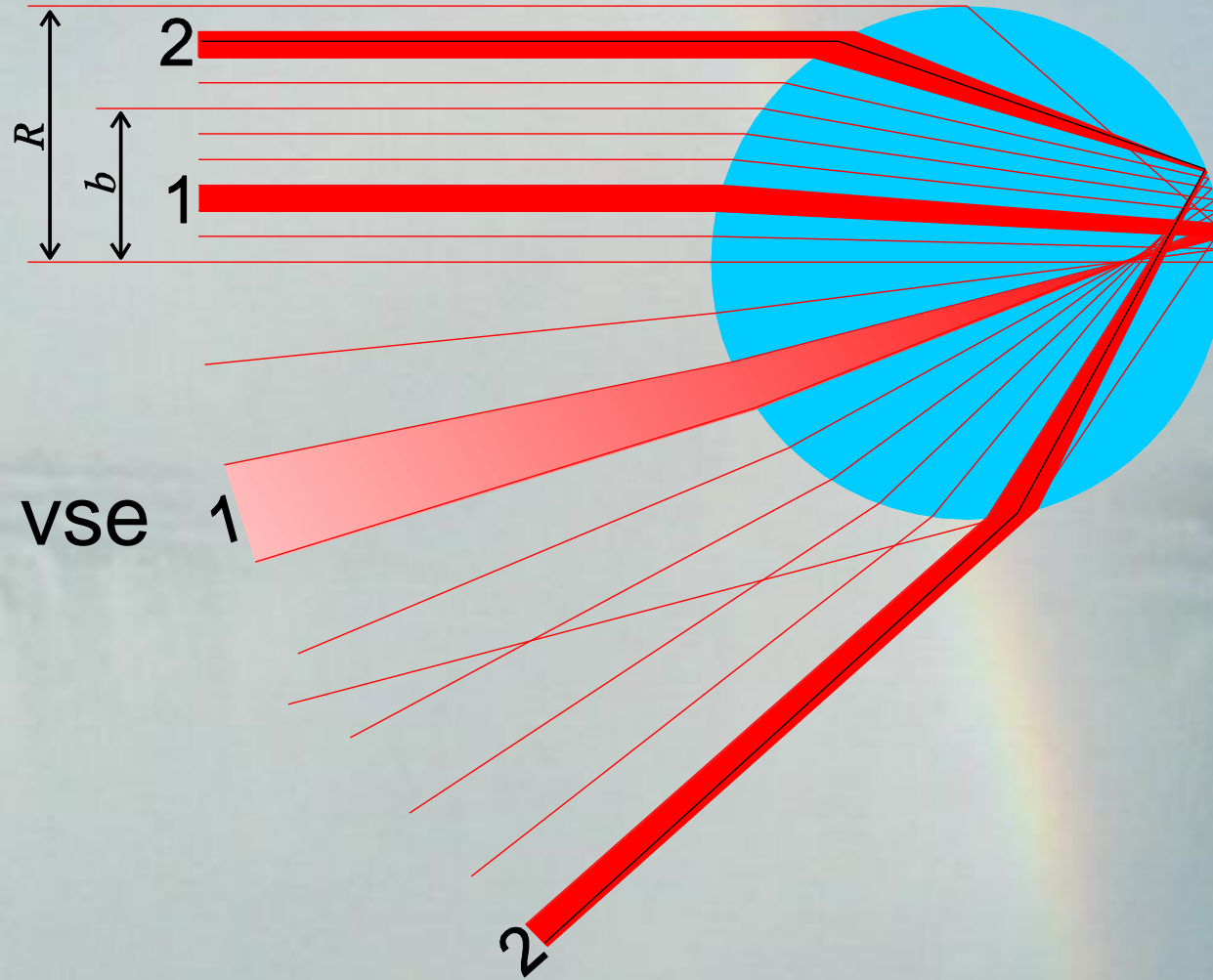
- eden (parameter) za vse

$$x = b/R$$

# Kako nastane mavrica



- potek žarkov



- eden (parameter) za vse

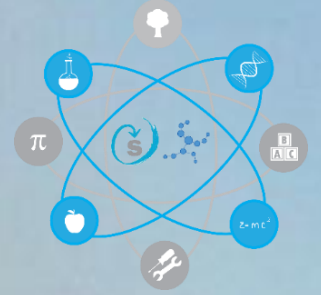
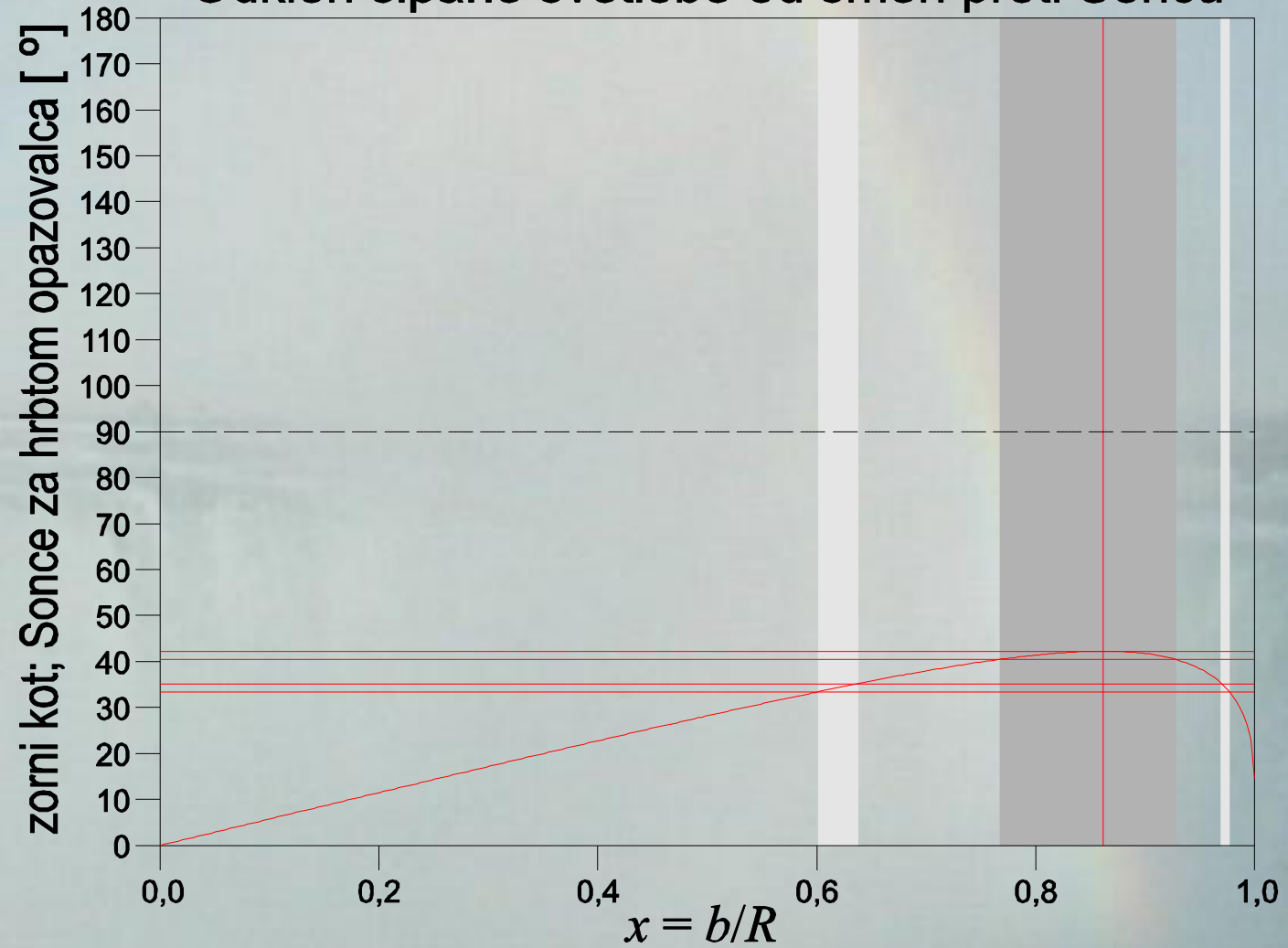
$$x = b/R$$



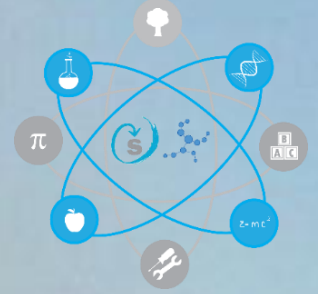
# Kako nastane mavrica

- potek žarkov

Odklon sipane svetlobe od smeri proti Soncu



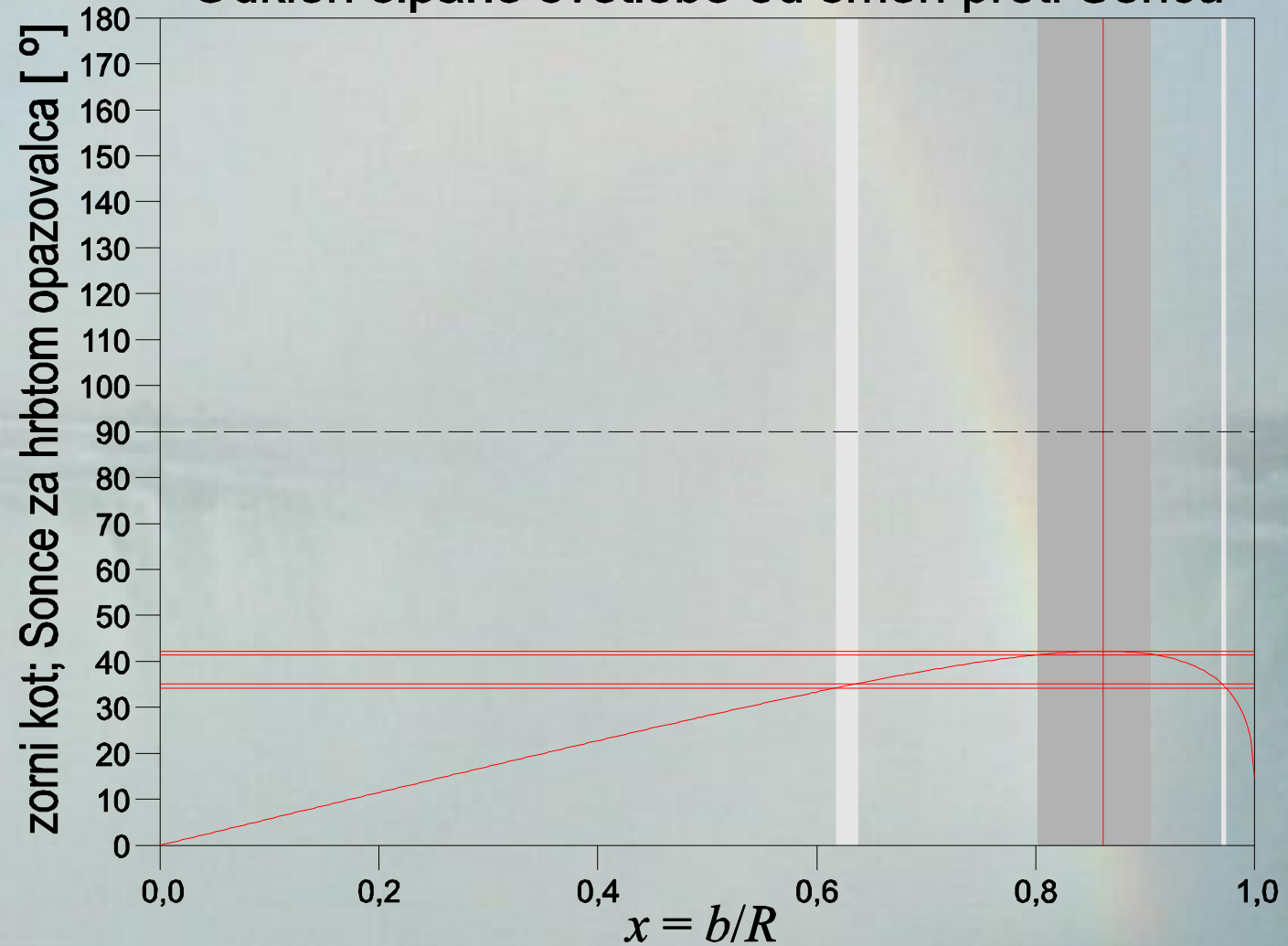
# Kako nastane mavrica



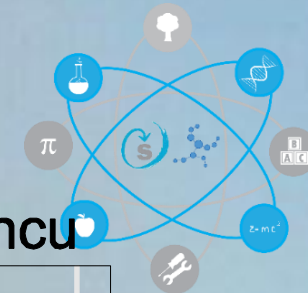
- potek žarkov

“zgostitev”  
ob ekstremu

Odklon sipane svetlobe od smeri proti Soncu



# Kako nastane mavrica



- potek žarkov
- pomen ekstrema

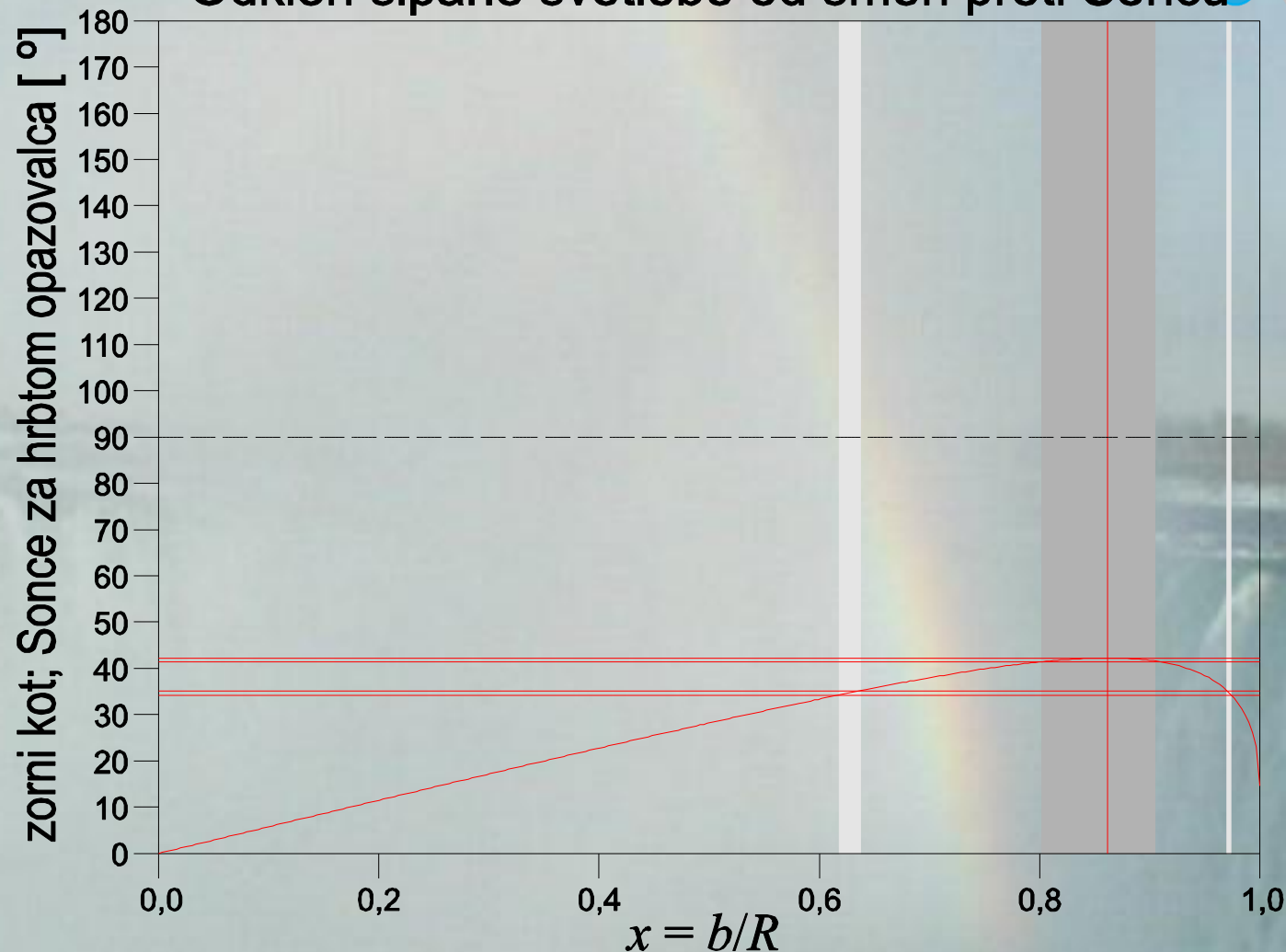
nadmorska višina

vrh/dolina ali pobočje

vrh: ~ enako

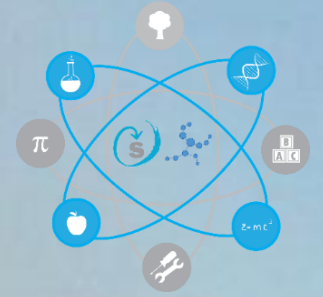
pobočje: zelo odvisno

Odklon sipane svetlobe od smeri proti Soncu





# Kako nastane mavrica

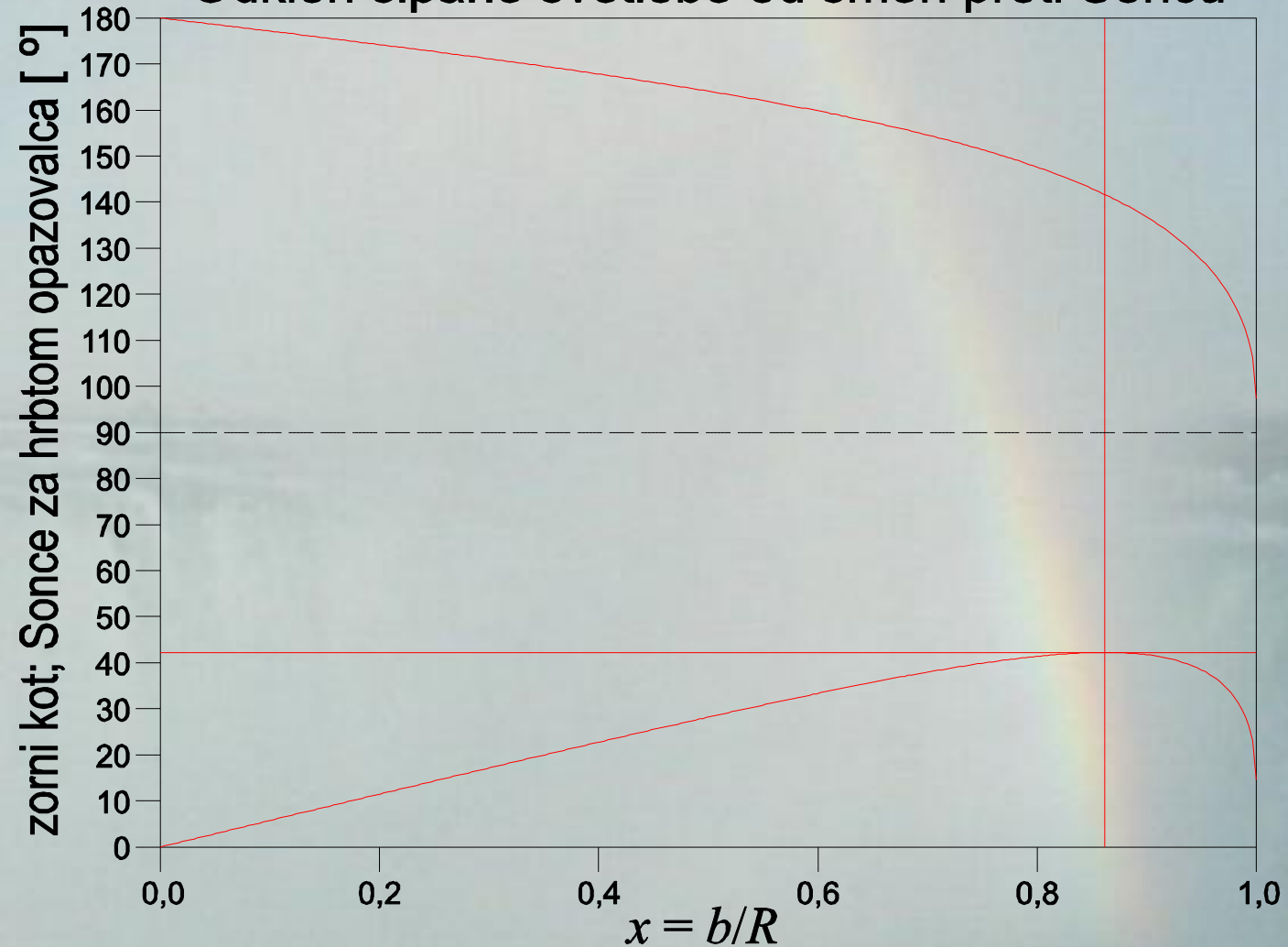


- potek žarkov

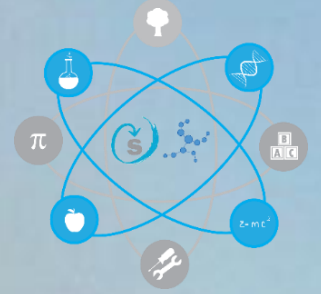
samo lom

en notranji odboj

Odklon sipane svetlobe od smeri proti Soncu



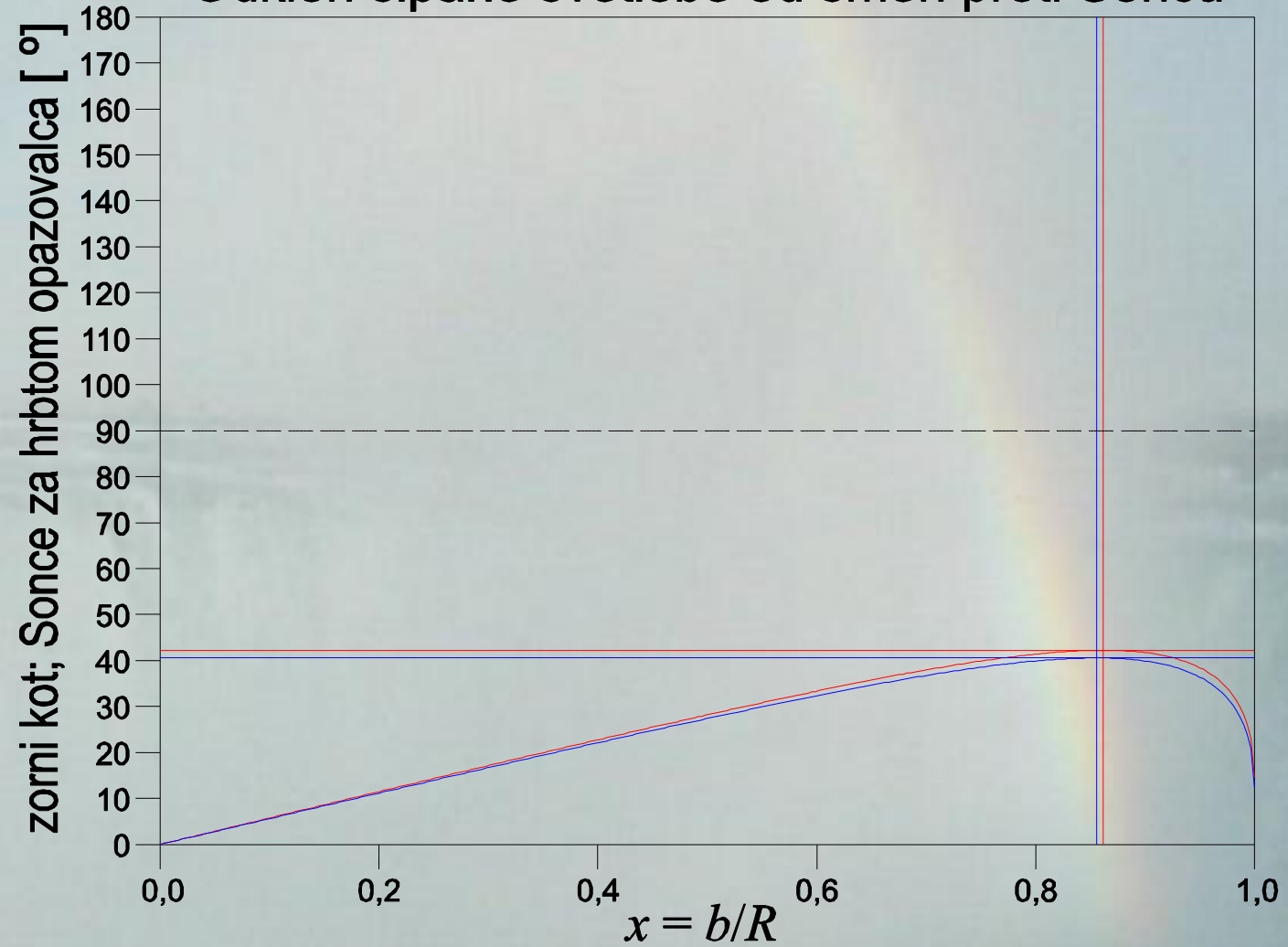
# Kako nastane mavrica



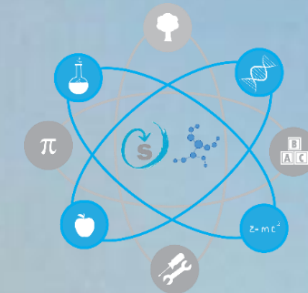
- potek žarkov

disperzija

Odklon sipane svetlobe od smeri proti Soncu



# Kako nastane mavrica



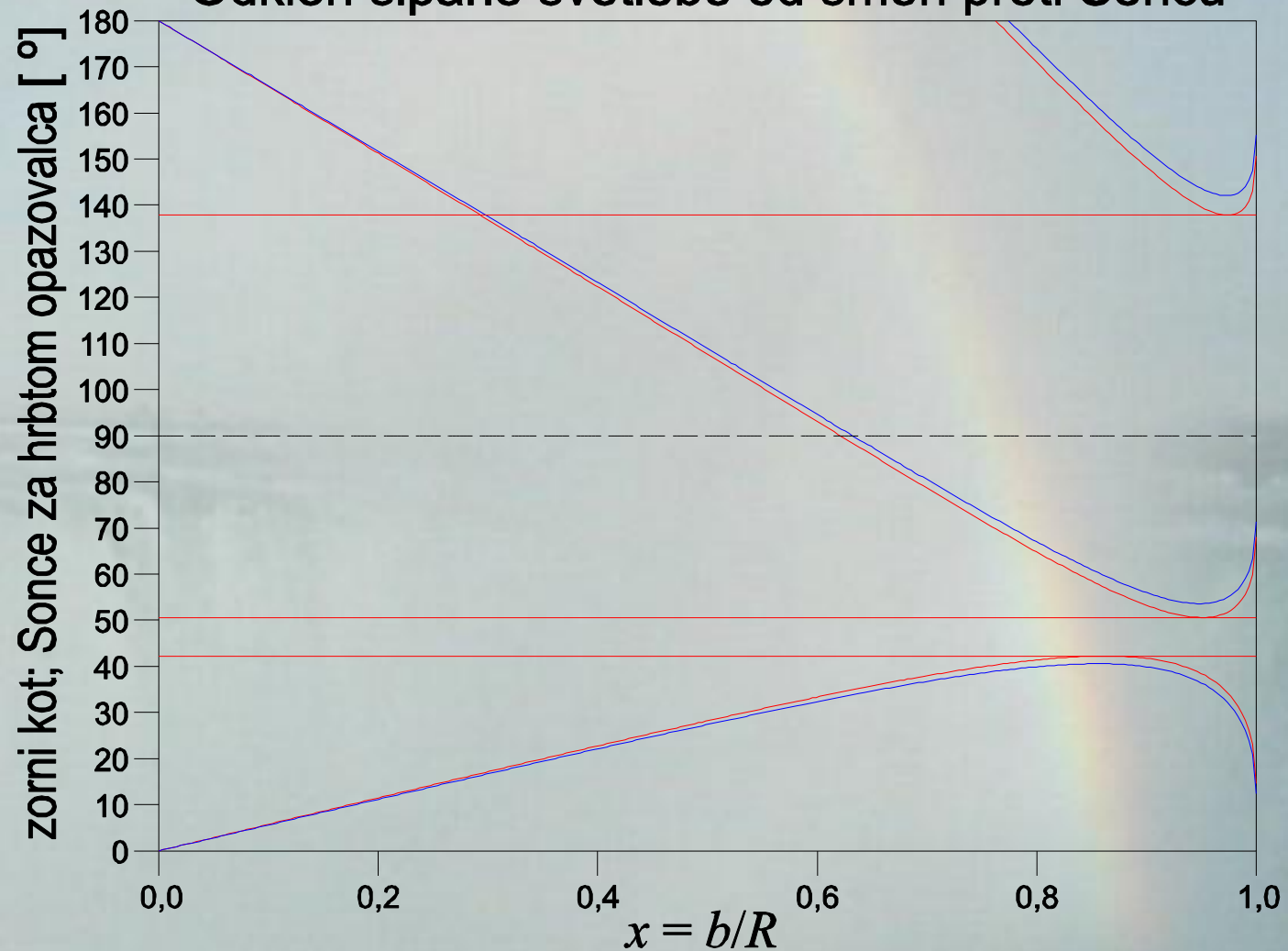
- potek žarkov

tretji red

drugi red

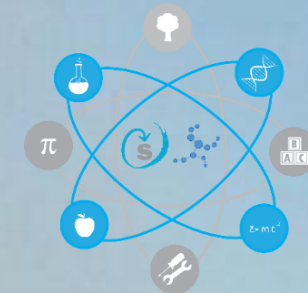
prvi red

Odklon sipane svetlobe od smeri proti Soncu





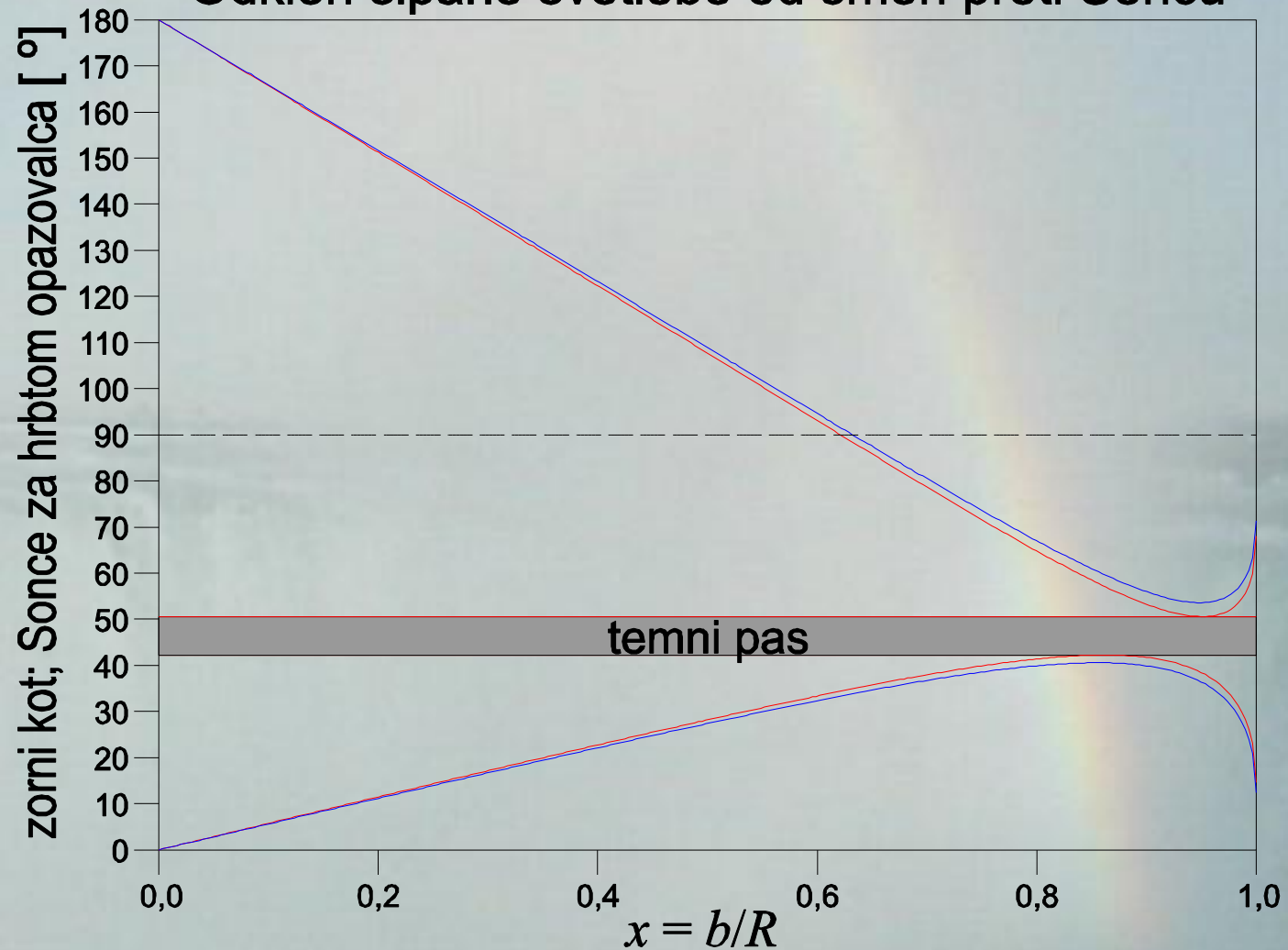
# Kako nastane mavrica



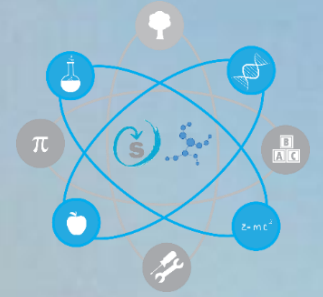
- potek žarkov

sekundarna  
primarna

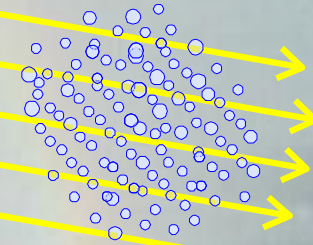
Odklon sipane svetlobe od smeri proti Soncu



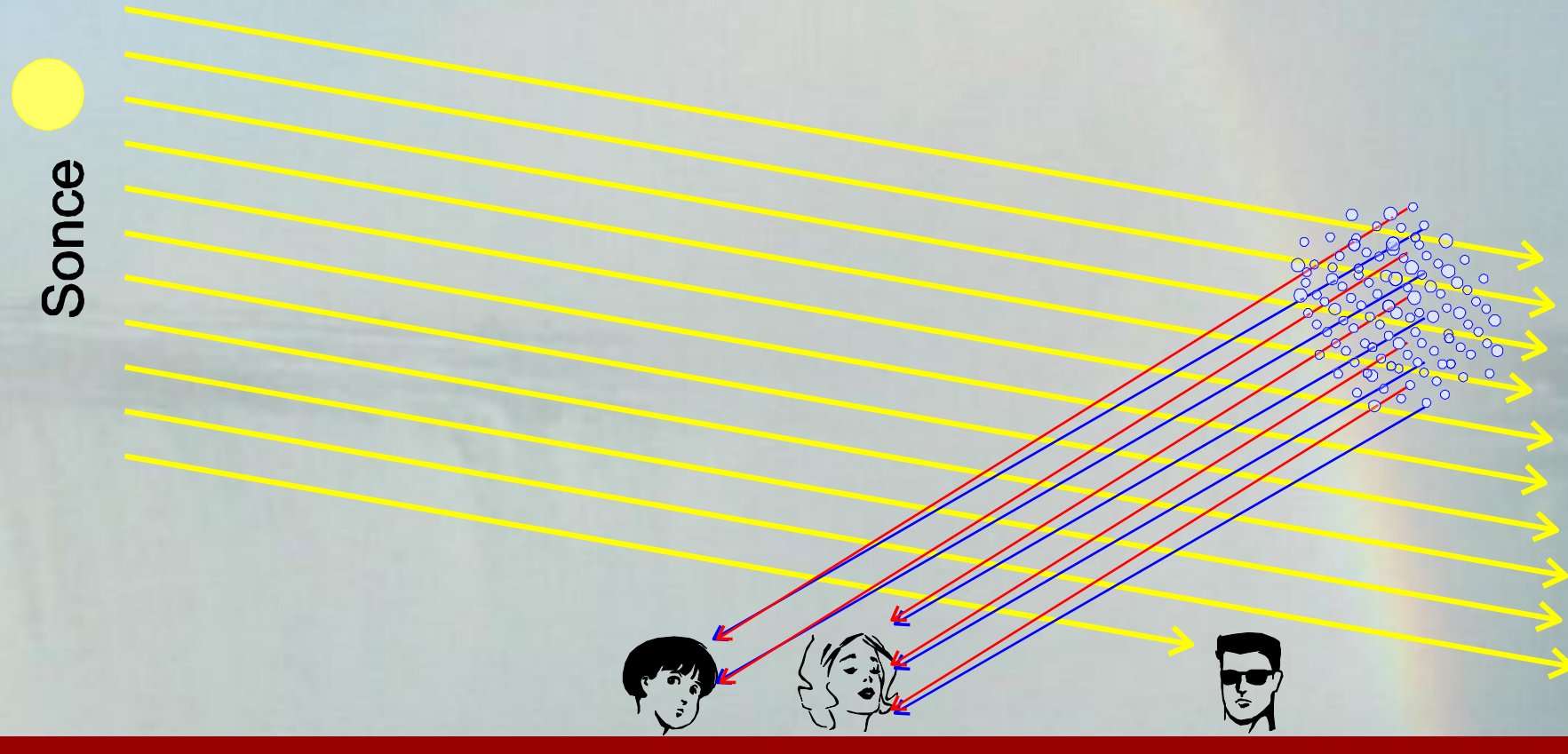
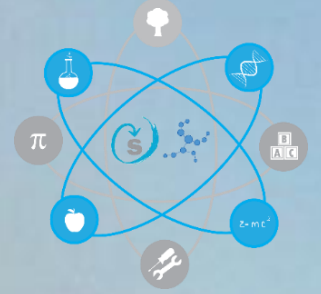
# Kdo vidi mavrico?



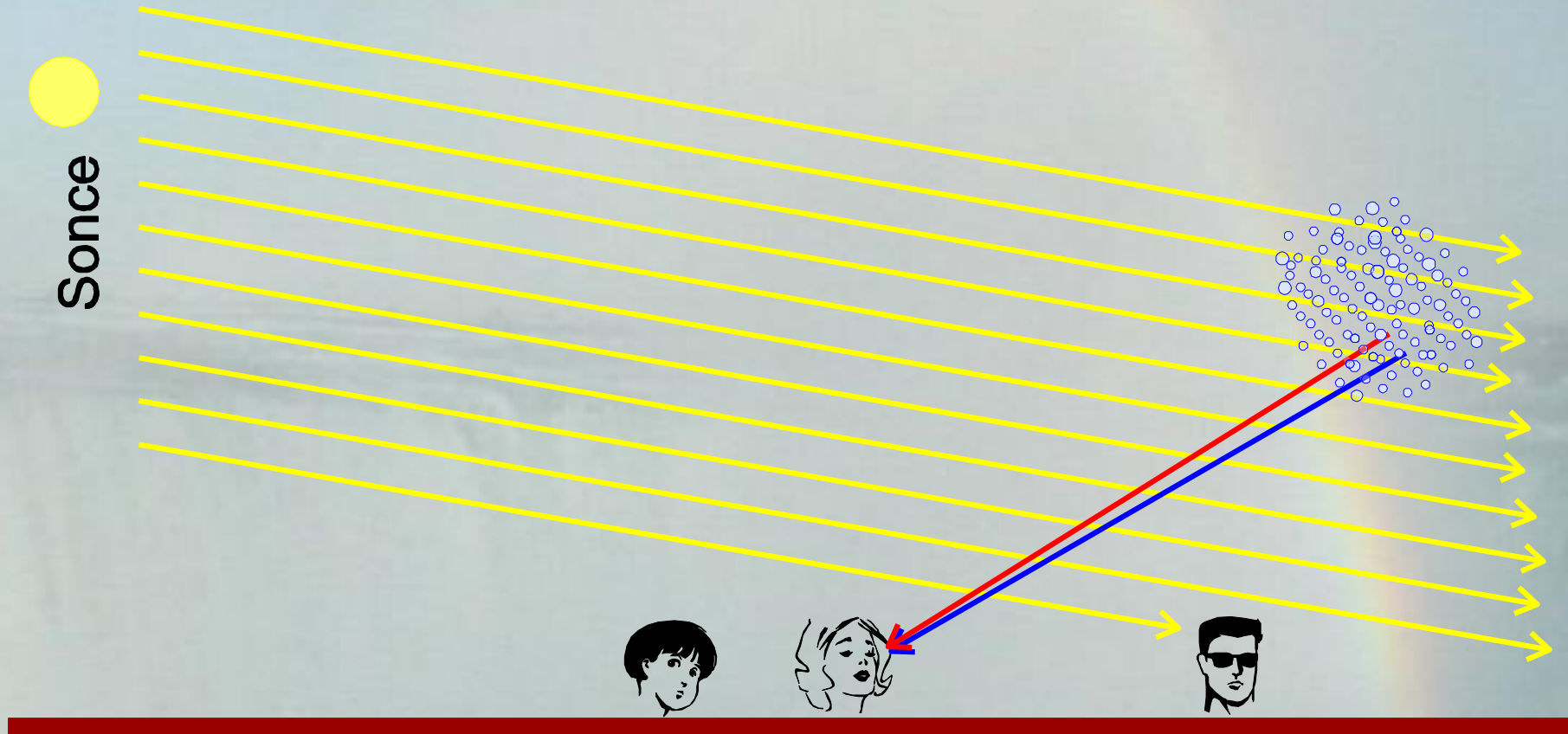
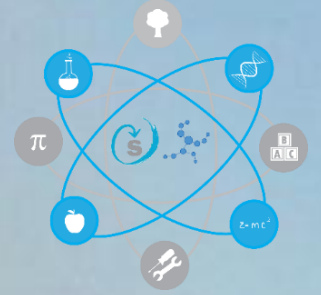
Sonce



# Kdo vidi mavrico?

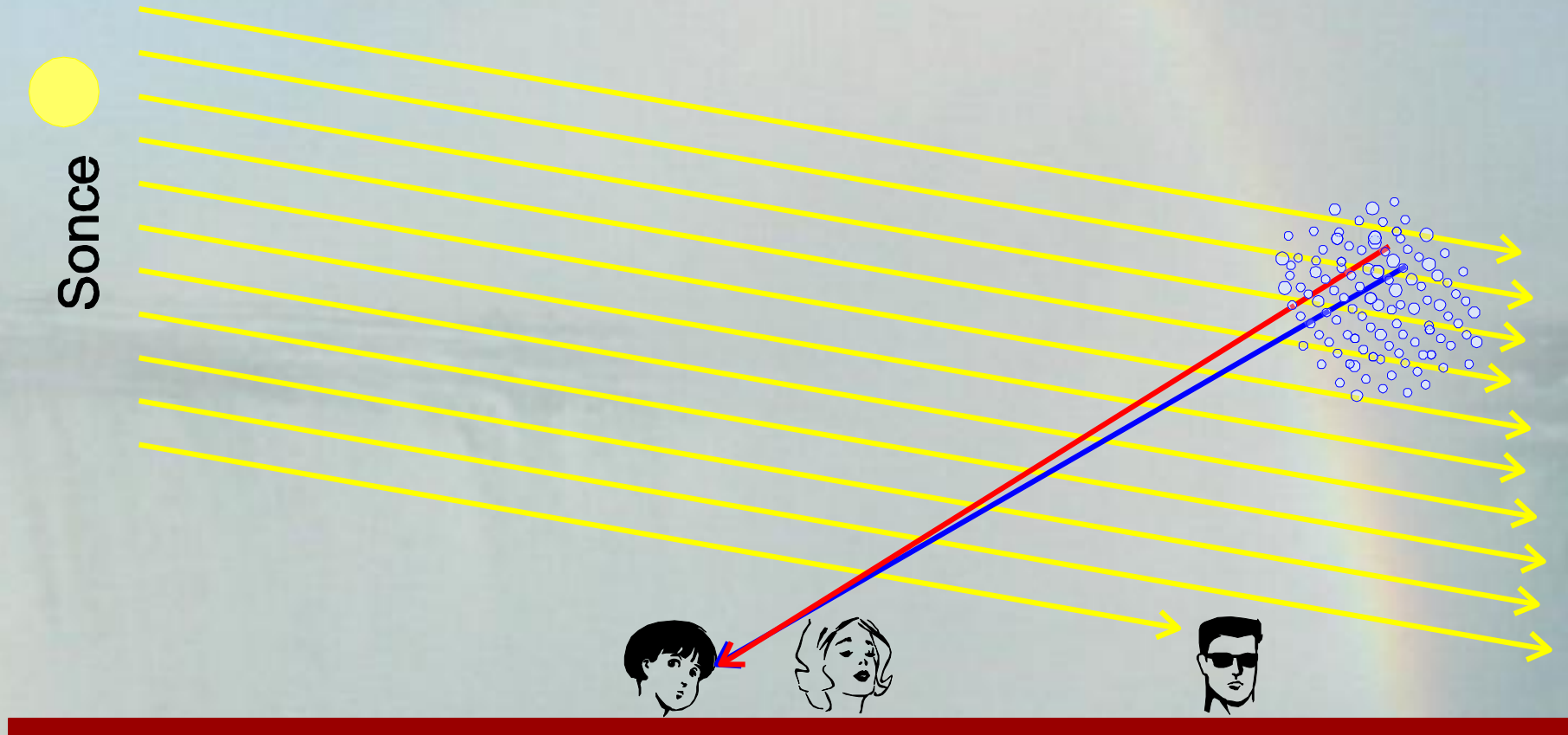
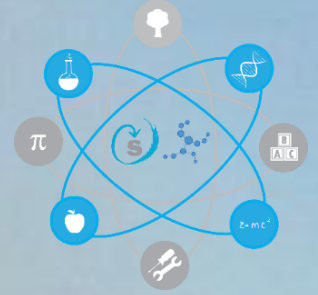


# Kako vidimo mavrico

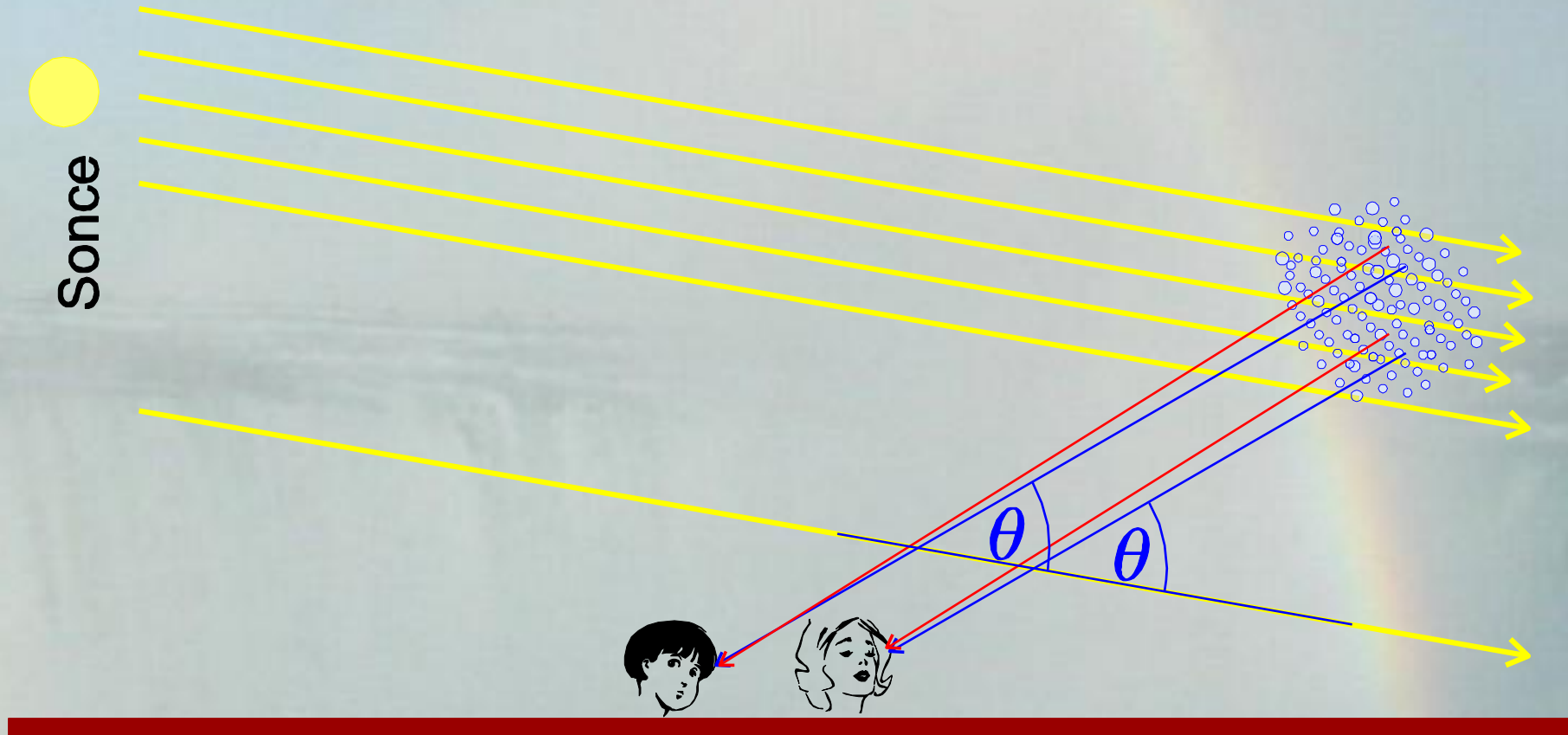
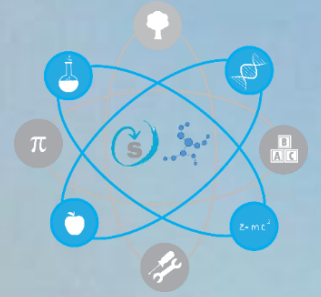




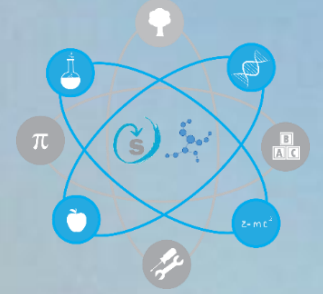
# Kako vidimo mavrico



# Kako vidimo mavrico

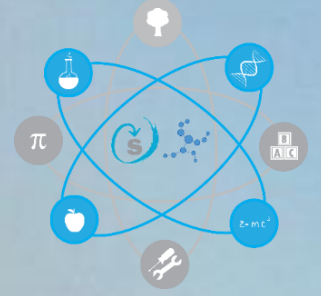


# Zaključek



- mavrico gledamo s Soncem za hrbtom
- vzporedni snopi svetlobe
- zorni kot primarne  $42^\circ$  in sekundarne  $51^\circ$
- nujno: **disperzija** ( $dn/d\lambda \neq 0$ ) in **ekstrem**  $\theta(b/R)$
- barve v primarni: **modra** ( $40^\circ$ )  $\rightarrow$  **rdeča** ( $42^\circ$ )
- Aleksandrov temni pas od  $42^\circ$  do  $51^\circ$

# za geometrijsko optiko

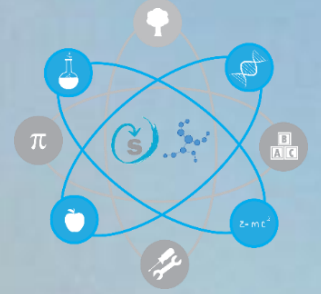


- nadštevilne mavrice – valovna optika
- minimalni kot odklona
  - malo manjši in malo večji vpadni parameter
  - interferenca teh valovanj
- znotraj primarne mavrice
- velikost kapljic
  - male, nekaj širokih pasov ojačitev/oslabitev
  - velike, mnogo ozkih pasov





# kapljice – sfere, elipsoidi



- majhne kapljice
  - površinska napetost → sferična oblika
  - prispevek povsod
- velike kapljice
  - gravitacija → podolgovate, osno simetrične
  - prispevek nizko nad obzorjem