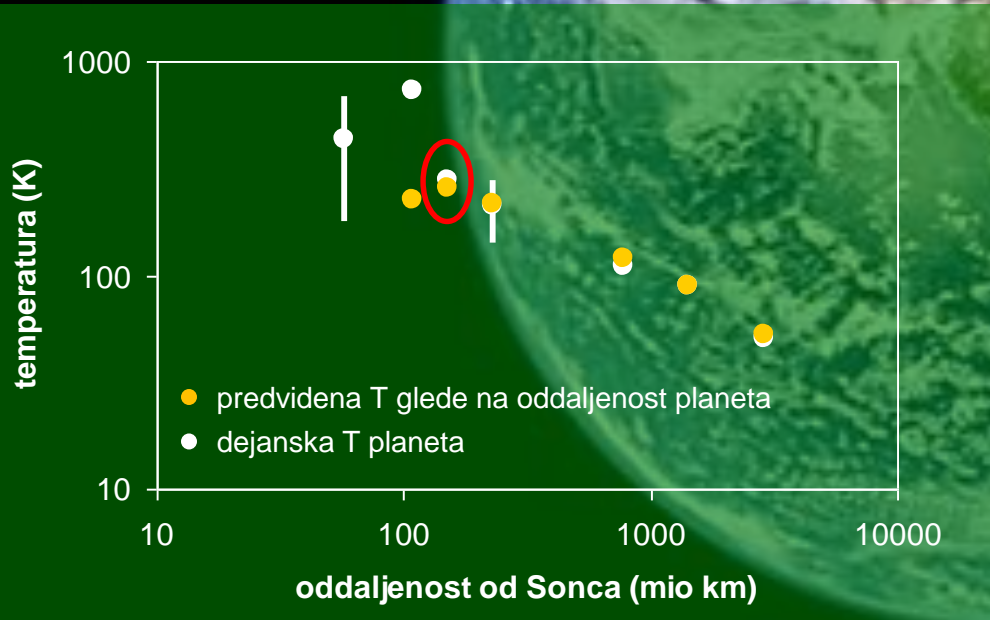
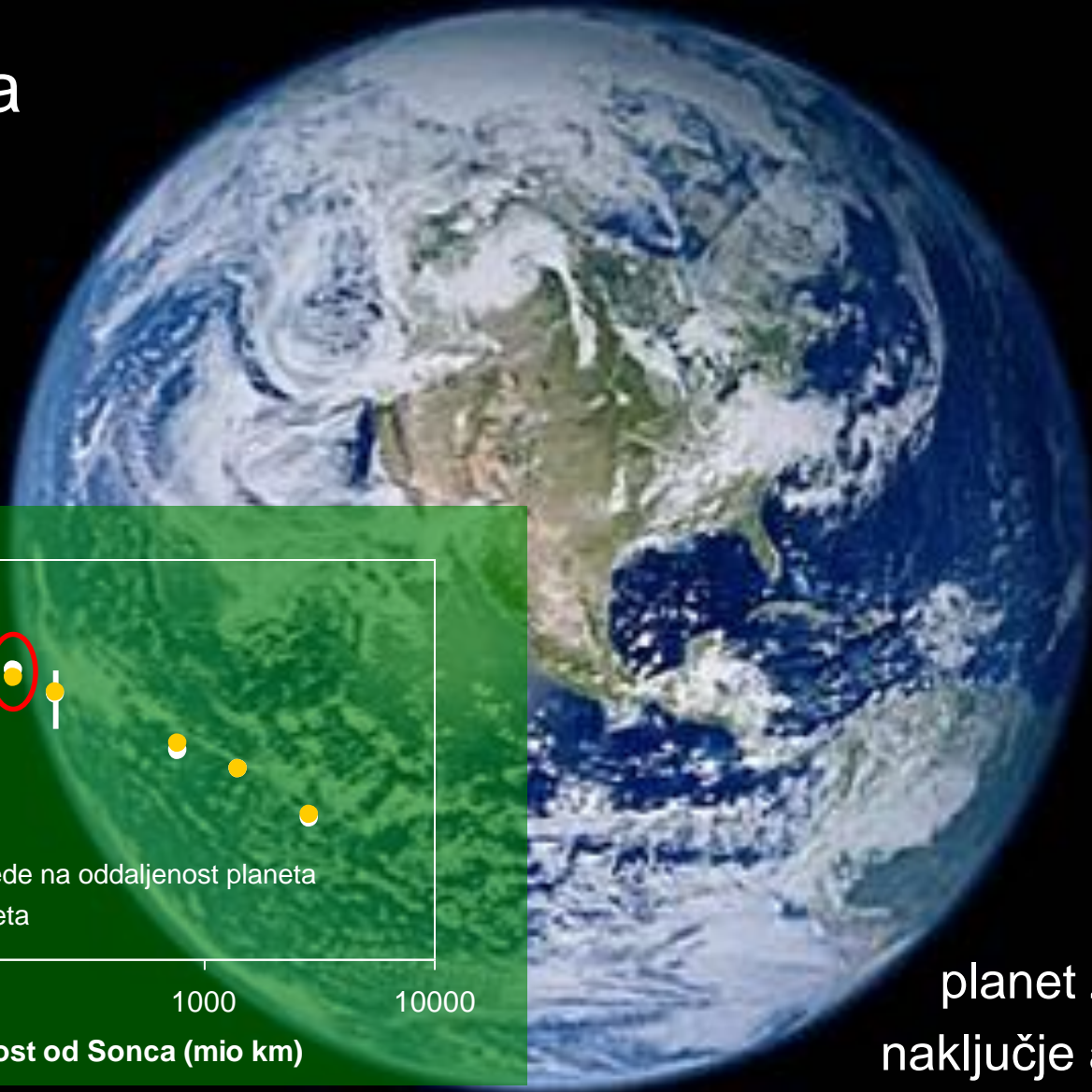


# Molekularna biofizika

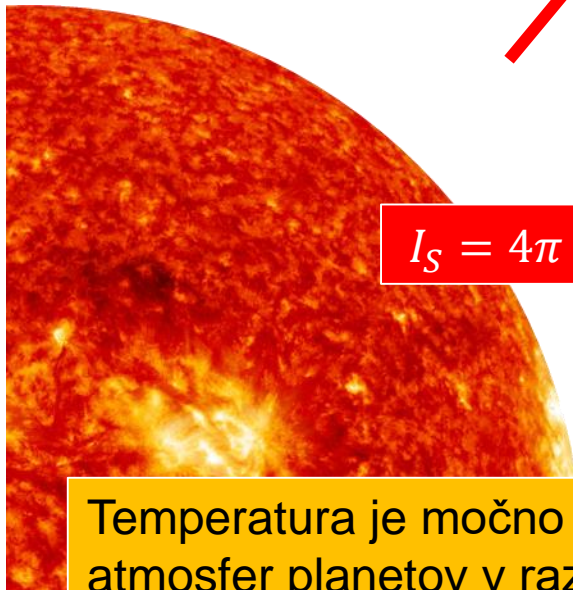


planet Zemlja –  
naključje ali pravilo ?

# Pogled fizika

$$R_{S-Z} = 150\,000\,000\text{ km}$$

$$T_S = 5\,800\text{ K}$$
$$R_S = 700\,000\text{ km}$$



$$I_S = 4\pi R_S^2 \sigma T_S^4$$

$$t_{VIS} \frac{\pi R_Z^2}{4\pi R_{S-Z}^2} I_S$$

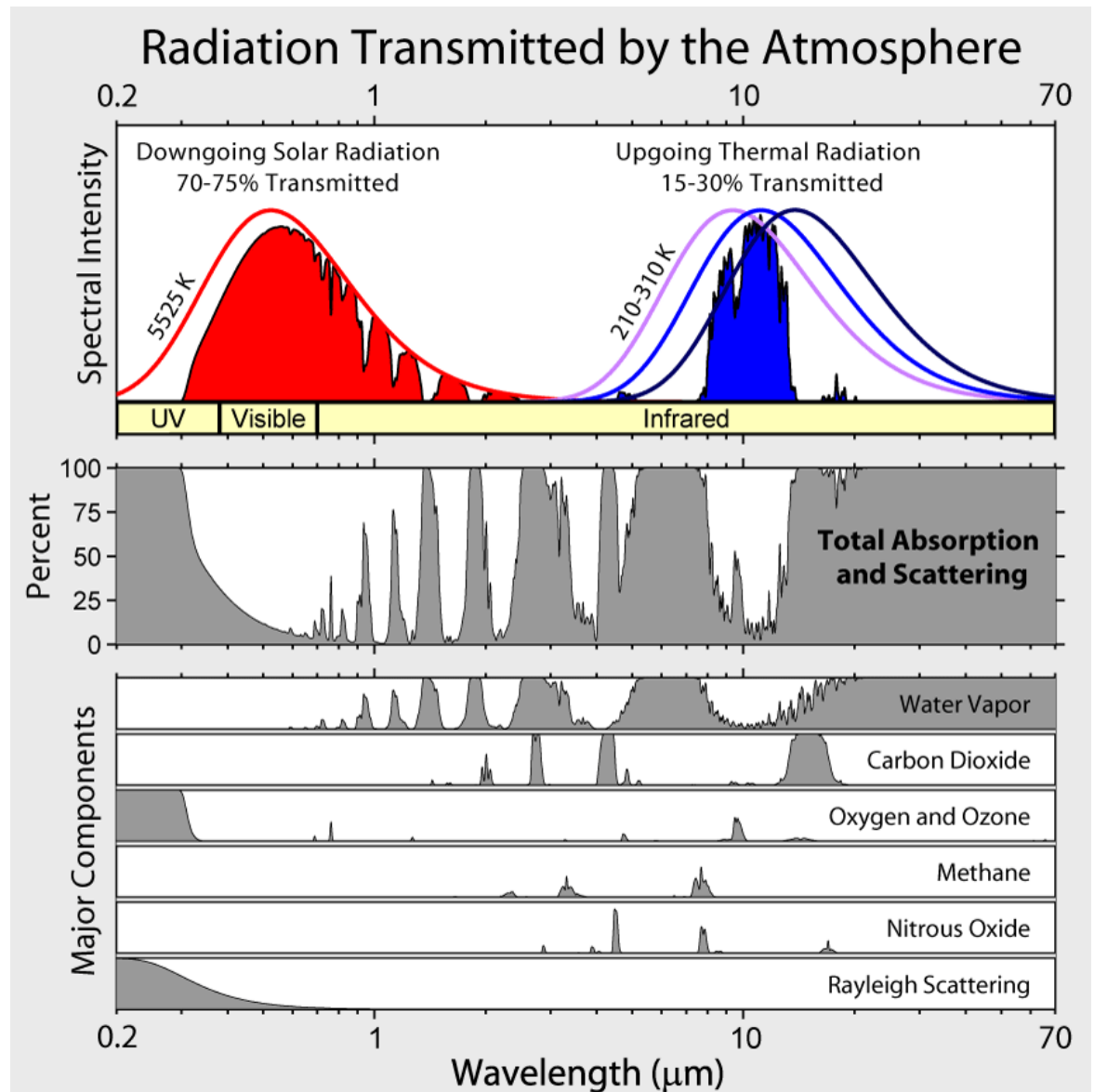
$$t_{IR} 4\pi R_Z^2 \sigma T_Z^4$$

$$T_Z = T_S \sqrt{\frac{1}{2}} \frac{R_S}{R_{S-Z}} \sqrt[4]{\frac{t_{VIS}}{t_{IR}}}$$
$$T_Z = 278\text{ K} \sqrt[4]{\frac{t_{VIS}}{t_{IR}}}$$

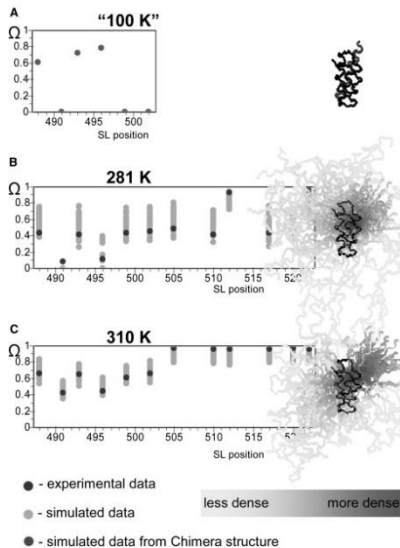
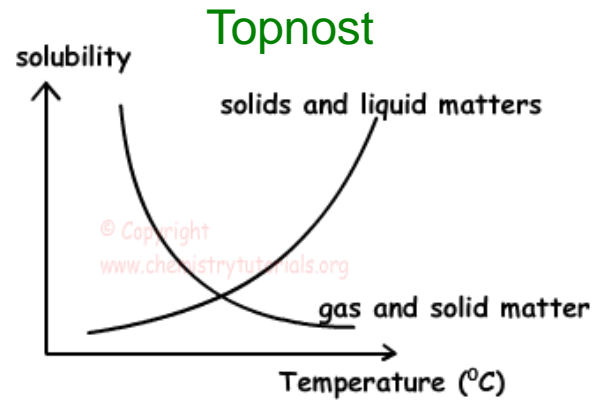
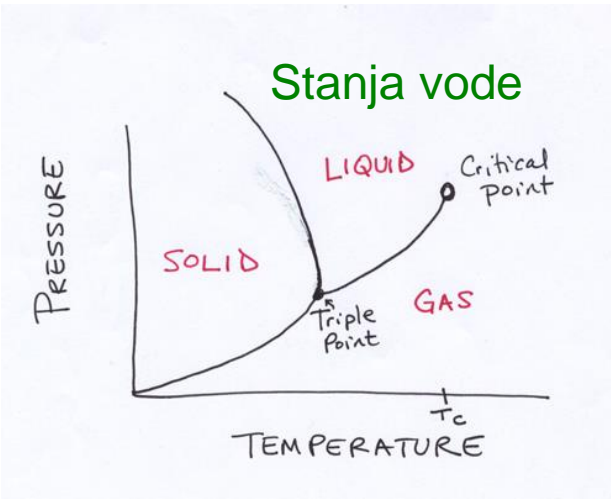
Temperatura je močno odvisna od prepustnosti atmosfer planetov v različnih delih EM spektra !

# Atmosferski toplogredni plini spremenijo temperaturo planeta

IR svetlobo absorbirajo  
ali sipajo tisti plini,  
katerih dipolni moment  
se spreminja med  
vibracijskimi stanji teh  
molekul !

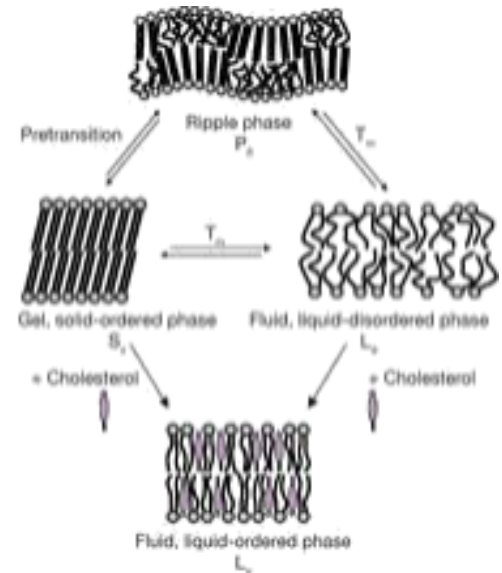


# Temperatura vpliva na ravnovesje med stanji



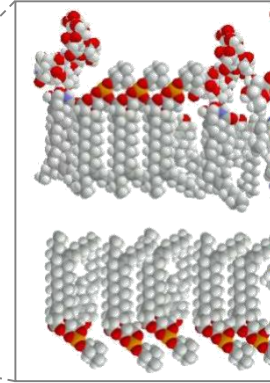
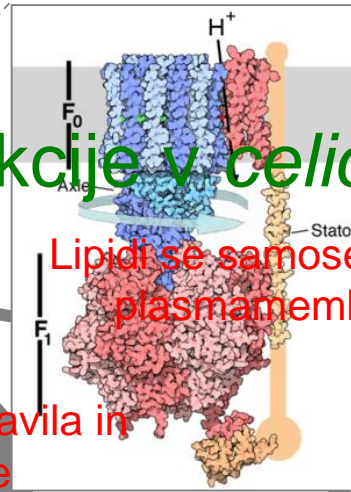
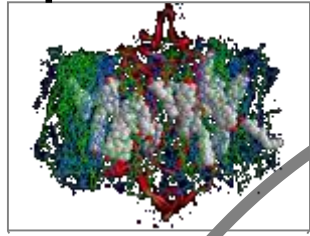
**Stanje proteinskih stikal**

**Stanje membrane**





# Pogled biofizika: povezati **strukture** in **funkcije v celici!**



DNA kodira pravila in gradnike

Enzimi in transporterji

prenašalci

receptorji

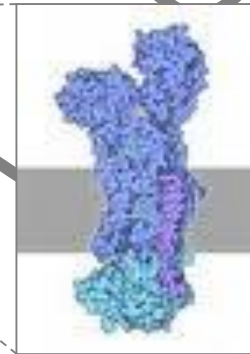
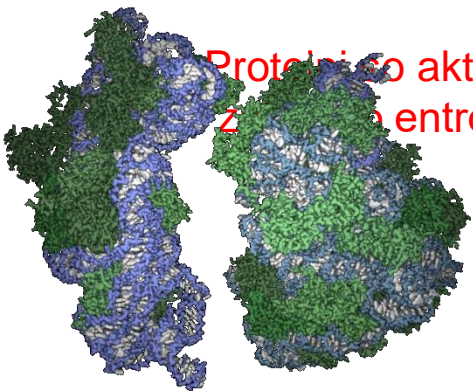
... In membrane celičnih organelov

enzimi

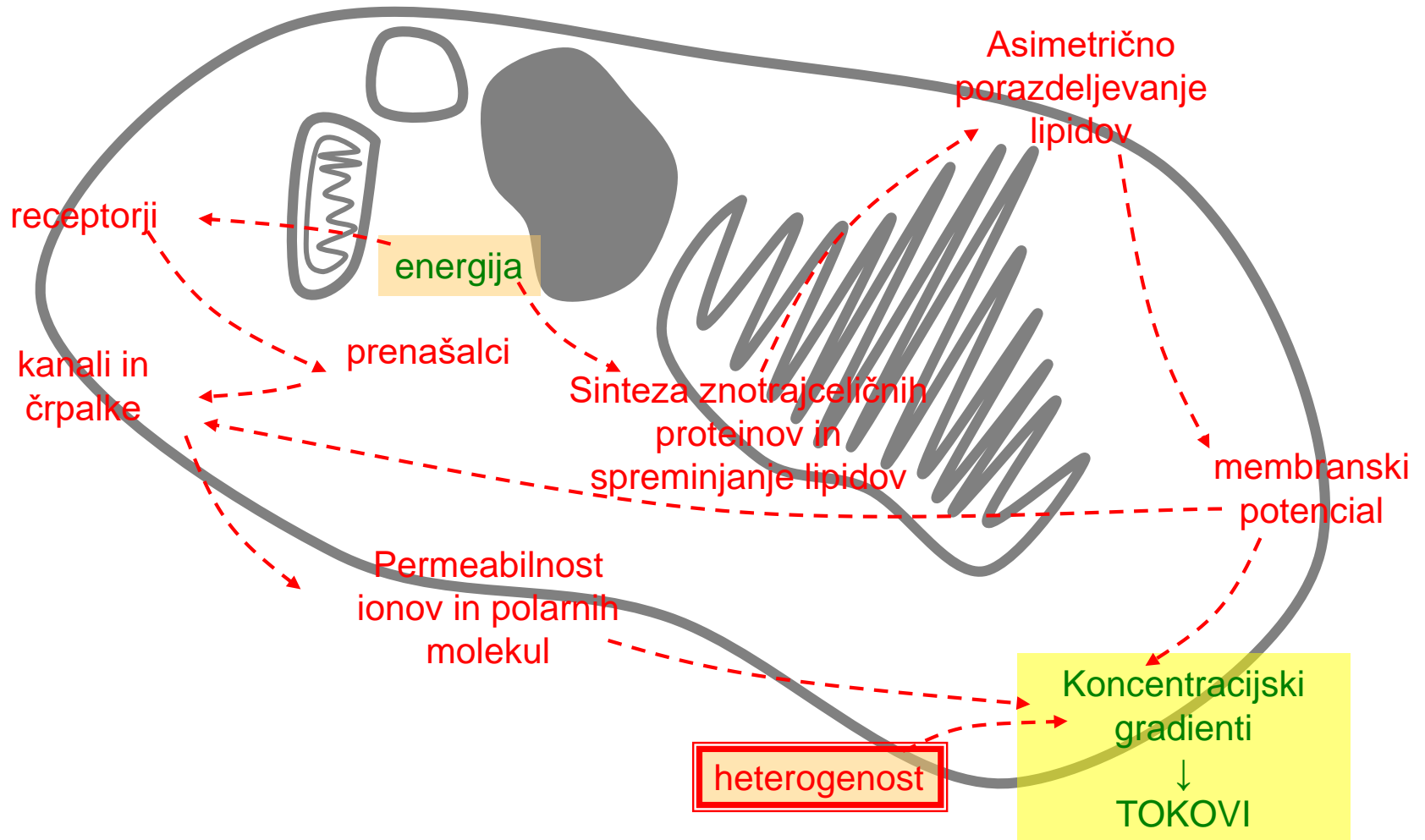
kanali

črpalke

Proteini so aktivni in zahtevajo entropijo!



# Dilema biofizika: kaj dela celico **živo** ali **mrtvo**?





A scanning electron micrograph (SEM) of a cell, showing a complex, porous, and fibrous structure. The cell is filled with numerous small, red, disc-shaped structures, likely red blood cells, and a few larger, yellow, irregular structures. The overall appearance is that of a highly organized, interconnected network of biological material.

Bistvo molekularne biofizike je razumeti...

... molekularne strukture in njihovo spreminjanje,

interakcije med njimi

in njih povezovanje v kompleksen sistem,

kakršen je živa celica !

# Molekularna biofizika

- Program: Laboratorijska biomedicina
- Predavanja in vaje (FFA, P2):  
**prof.dr. Janez Štrancar in dr. Iztok Urbančič**  
Jožef Stefan Institut, Odsek za fiziko trdne snovi, Laboratorij za biofiziko
- Seminarske vaje (IJS-F5, LBF):  
+ dr. Iztok Urbančič in kolegi LBF



# Molekularna biofizika

## PREDAVANJA (29h)

- Iz vode in drugih gradnikov
- Medmolekulske interakcije
- Termodinamika
- Zaznava specifičnih interakcij
- Samoorganizacija in strukture
- Površinski pojavi
- Gibljivost
- Membranski potencial
- Dinamika (supra)molekularnih sistemov
- Dinamika znotraj molekul, optične spektroskopije
- Metode za merjenje razdalj na molekularnem nivoju
- Zaključno predavanje

## VAJE

- Velikost gradnikov
- Interakcije
- Termodinamika
- Samoorganizacija – hidrofobna interakcija, membrane
- Samoorganizacija – DNA, proteini
- Površinski pojavi
- Gibljivost
- Membranski potencial
- Dinamika in spektroskopije
- Razno, ponavljanje

## SEMINARSKE VAJE (**udeležba obvezna**)

- V Laboratoriju za biofiziko, IJS

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***Biophysics***  
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***Molecular & Cell Biophysics***  
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***Nanobiotechnology – Concepts, Applications and Perspectives***  
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- P. J. Sinko  
***Martin's Physical Pharmacy and Pharmaceutical Sciences***  
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- M. M. Amiji  
***Applied Physical Pharmacy***  
(McGraw-Hill, New York, 2003)

# Preverjanje znanja

- Pisni izpit:  
preverjanje razumevanja snovi predavanj, vaj in seminarских vaj
- Ustni izpit – zagovor pisanega izpita