

OSNOVNI ZAKONI GEOMETRIJSKE OPTIKE

1. ZAKON PRAVOCRTNOG ŠIRENJA SVJETLOSTI

2. ZAKON O NEZAVISNOSTI SNOPOVA ZRAKA SVJETLOSTI

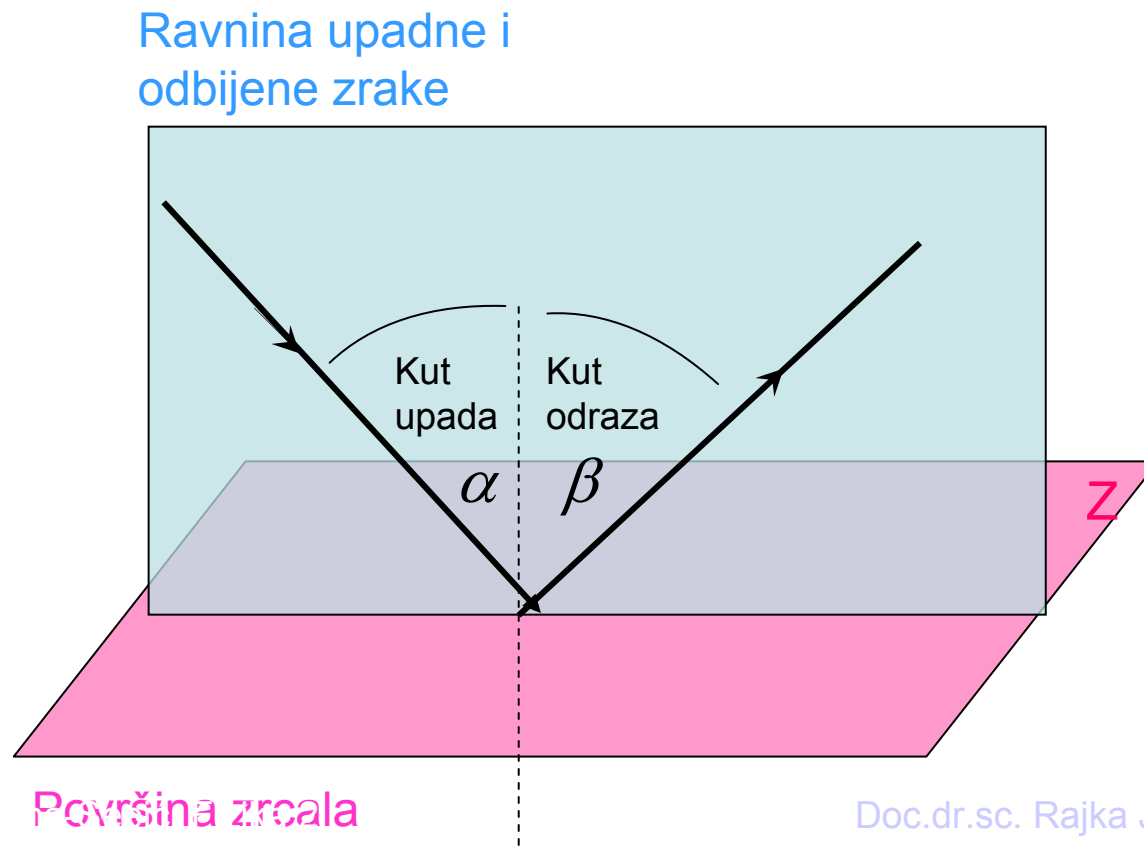
3. ZAKON ODBIJANJA ILI REFLEKSIJE SVJETLOSTI

4. ZAKON LOMA ILI REFRAKCIJE SVJETLOSTI

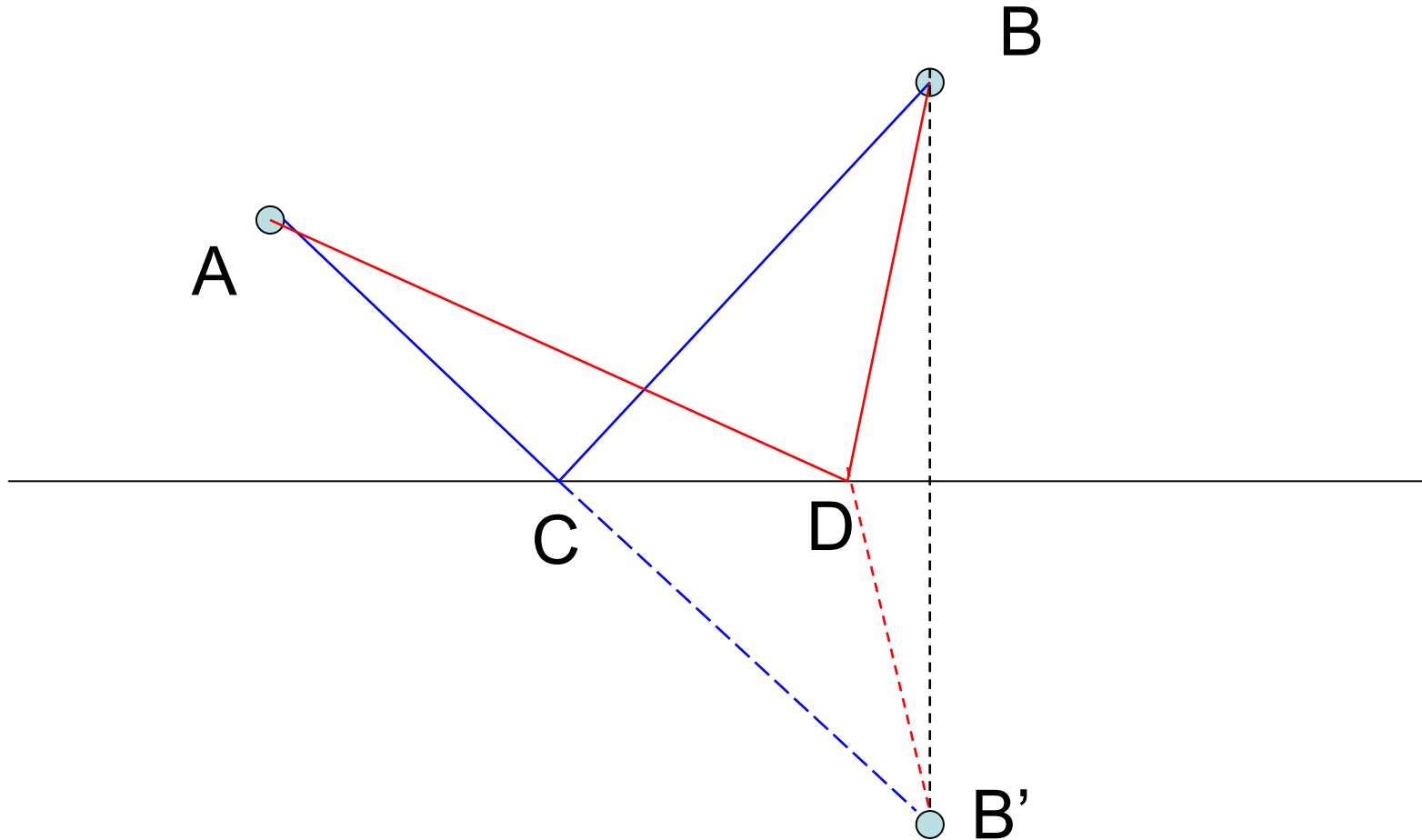
3. ZAKON ODBIJANJA ILI REFLEKSIJE SVJETLOSTI

Ako svjetlost upada na zrcalo Z, onda upadna i odbijena zraka leže u istoj ravnini okomitoj na površinu zrcala.

Kut odraza β jednak je kutu upada α .



Fermatov princip i zakon odbijanja



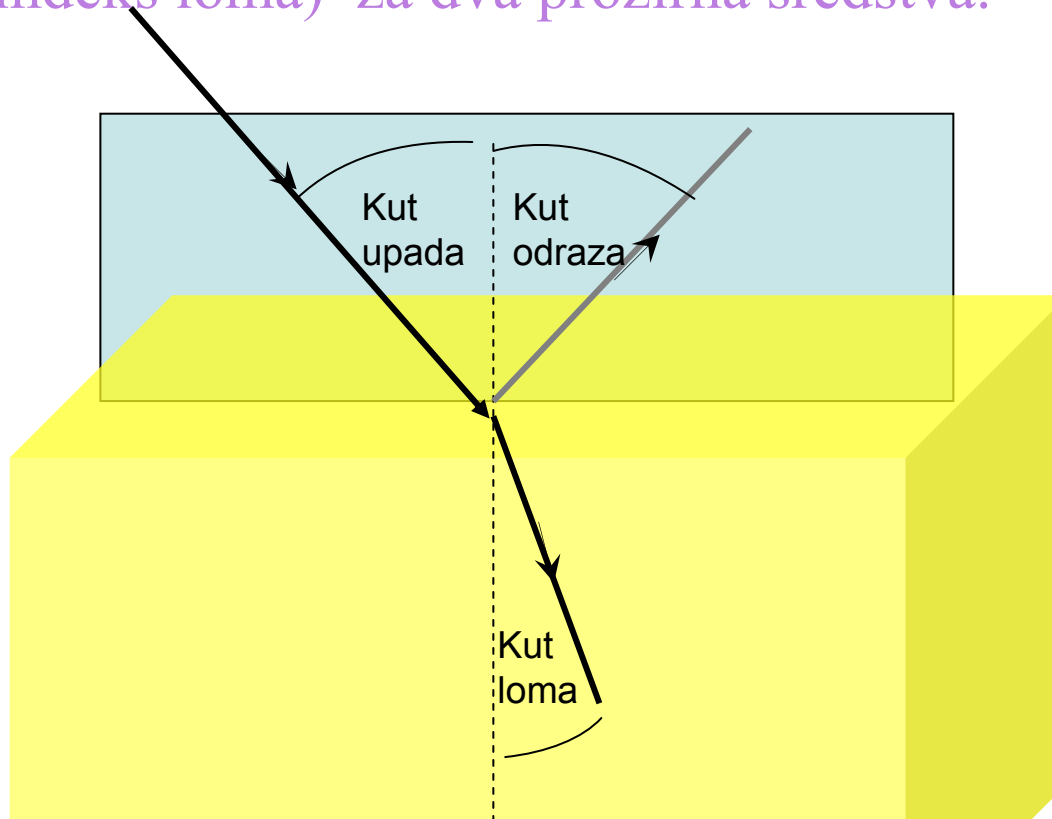
$d(A,D)+d(D,B')$ je uvijek veće od $d(A,B')$

4. ZAKON LOMA ILI REFRAKCIJE SVJETLOSTI

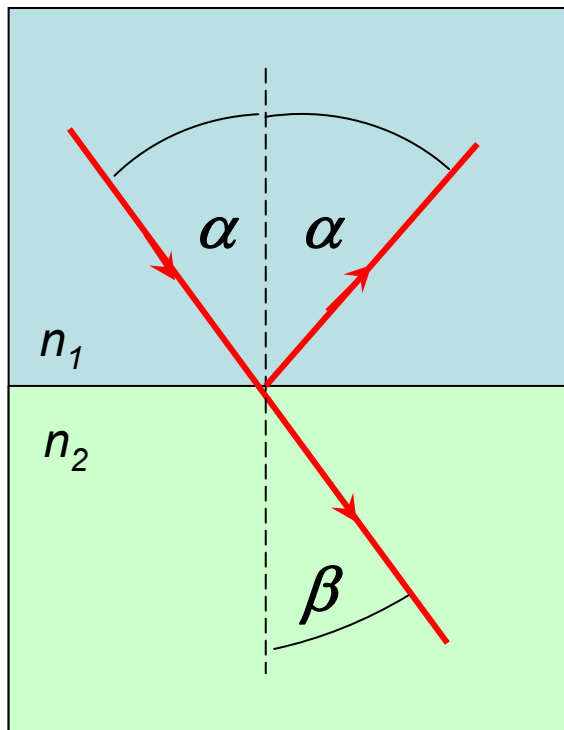
Ako svjetlost upada pod kutom na granicu prozirnoga sredstva, ona se djelomično odbija i djelomično lomi. Upadna, odbijena i lomljena zraka leže u istoj ravnini okomitoj na granicu sredstva.

Omjer sinusa upadnoga kuta i sinusa kuta loma je stalna vrijednost (relativni indeks loma) za dva prozirna sredstva.

Ravnina upadne,
odbijene
i lomljene zrake



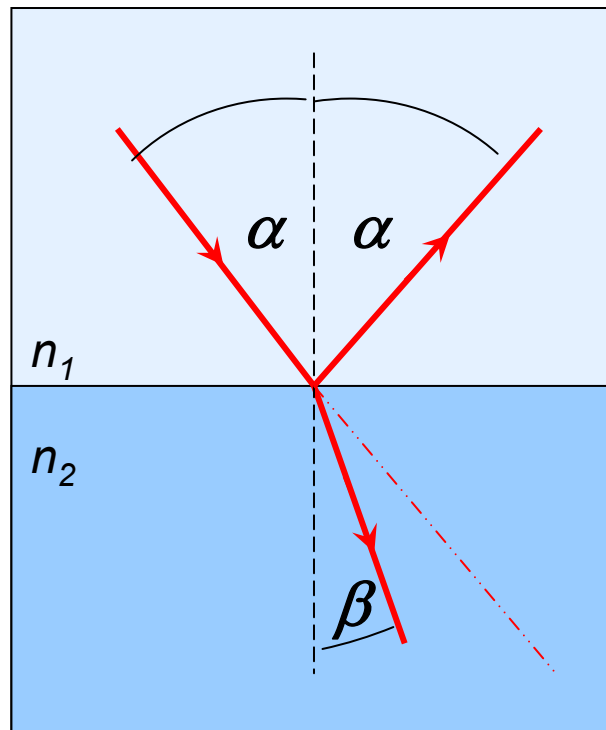
Lom svjetlosti



$$v_2 = v_1$$

$$n_2 = n_1$$

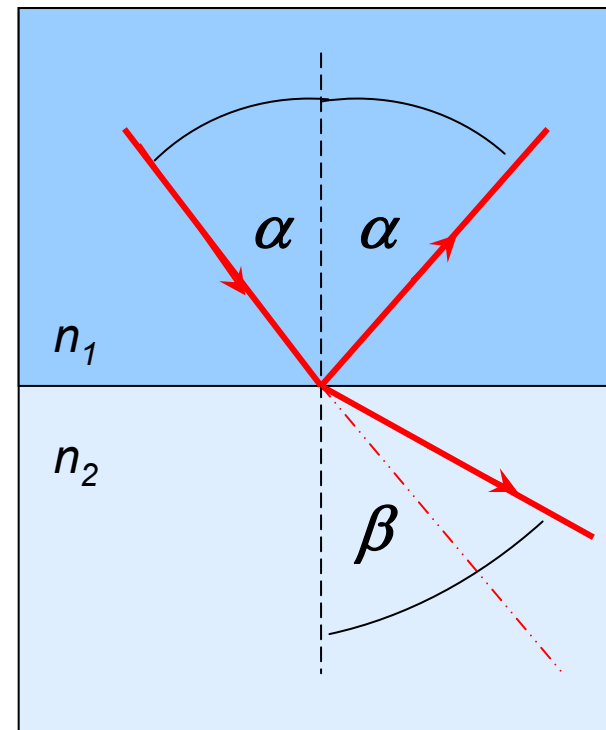
$$\beta = \alpha$$



$$v_2 < v_1$$

$$n_2 > n_1$$

$$\beta < \alpha$$

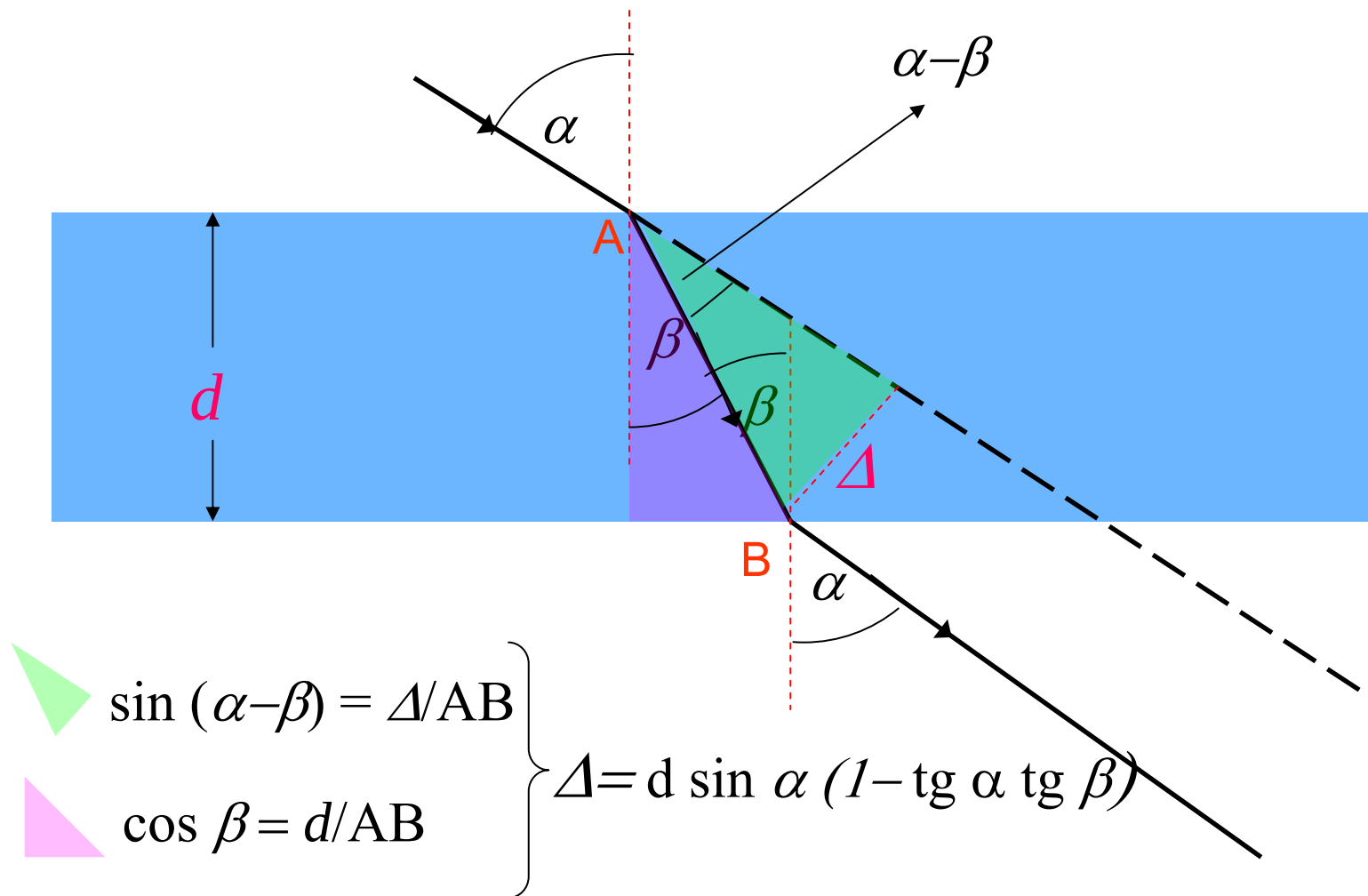


$$v_2 > v_1$$

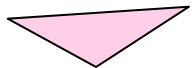
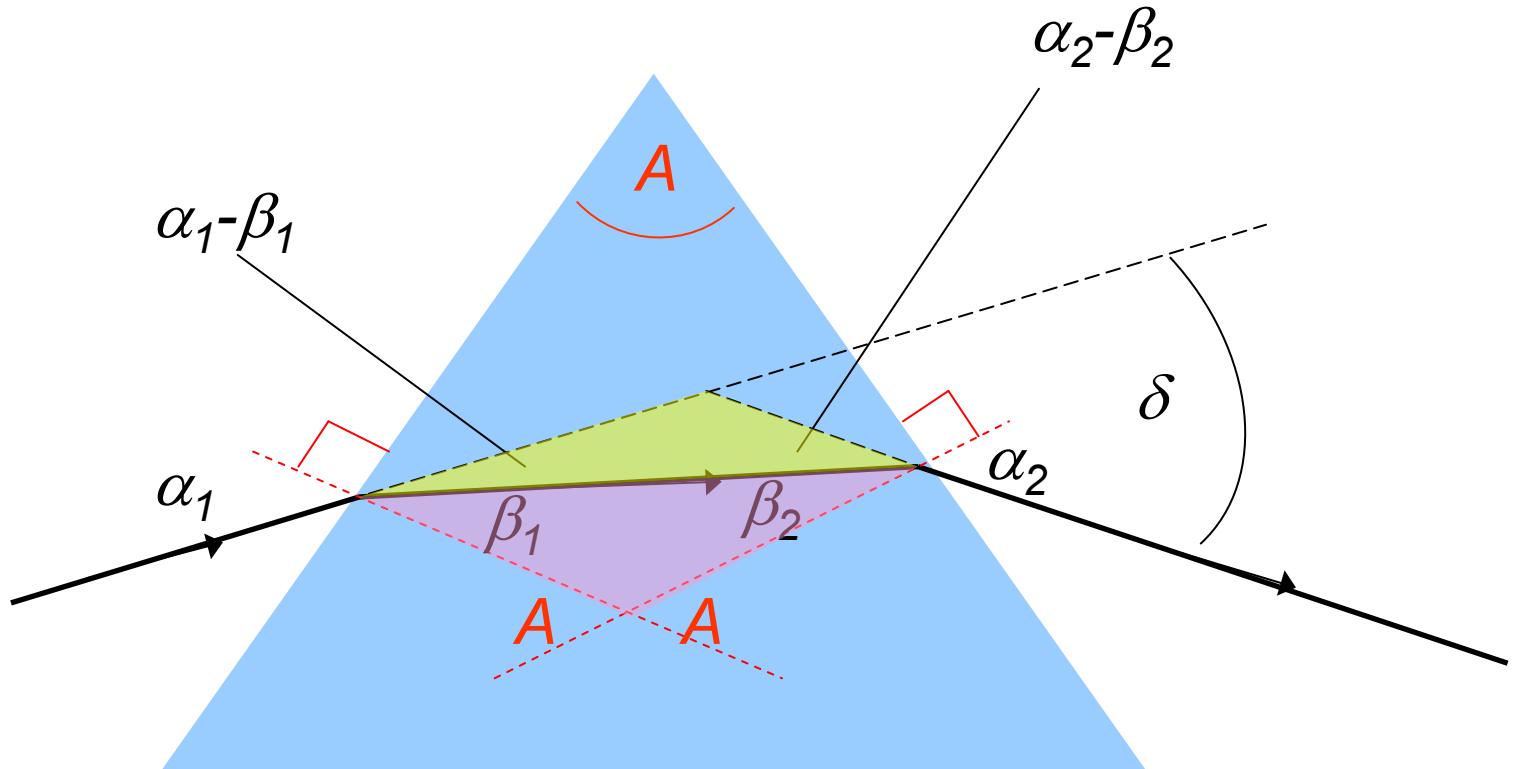
$$n_2 < n_1$$

$$\beta > \alpha$$

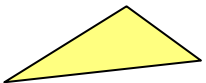
Planparalelna ploča



Optička prizma



A vanjski pa je suma unutarnjih tj. $A = \beta_1 + \beta_2$



δ vanjski pa je suma unutarnjih tj. $\delta = (\alpha_1 - \beta_1) + (\alpha_2 - \beta_2)$

Optička prizma – simetričan prolazak zrake svjetlosti

$$\left. \begin{aligned} A &= \beta_1 + \beta_2 \\ \delta &= (\alpha_1 - \beta_1) + (\alpha_2 - \beta_2) \end{aligned} \right\} \delta = \alpha_1 + \alpha_2 - A$$

ako zraka prolazi prizmom simetrično $\alpha_1 = \alpha_2 = \alpha$

$$\delta = 2\alpha - A \quad \alpha = \frac{\delta + A}{2}$$

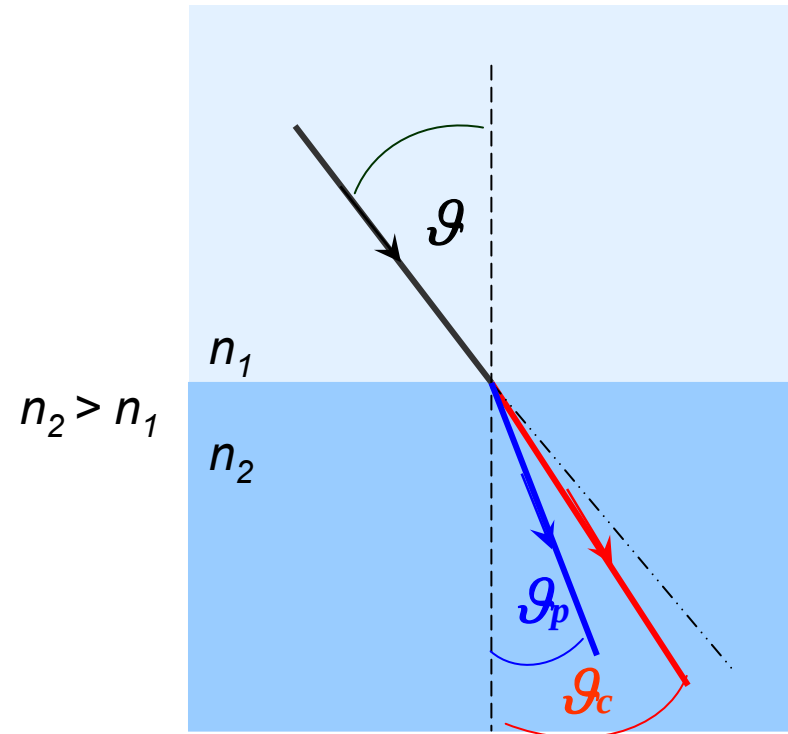
tada i $\beta_1 = \beta_2 = \beta$ $A = 2\beta$ tj. $\beta = A/2$

$$n = \frac{\sin \alpha}{\sin \beta} = \frac{\sin (\delta + A)/2}{\sin A/2} = \frac{\delta + A}{A}$$

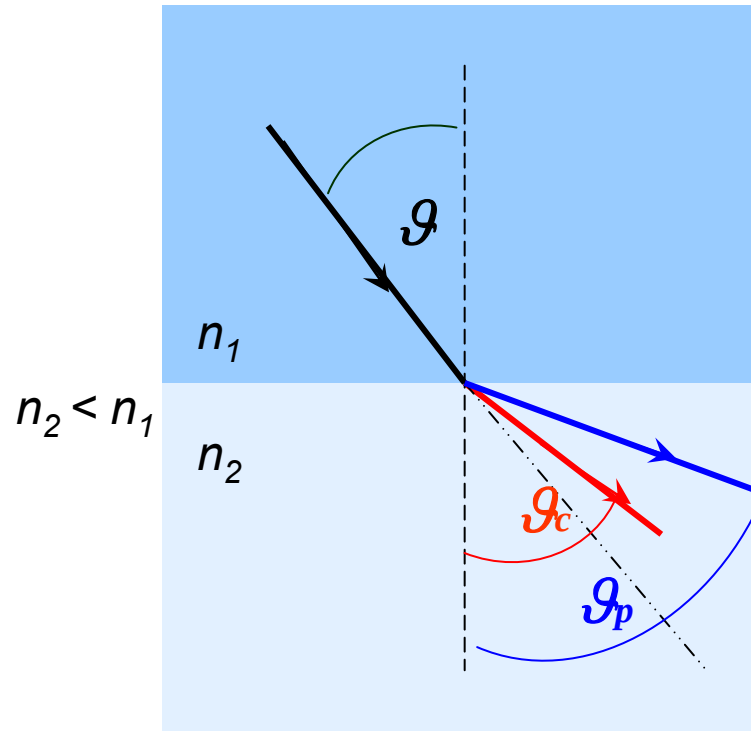
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Uz Gaussove aproksimacije

Kromatska disperzija



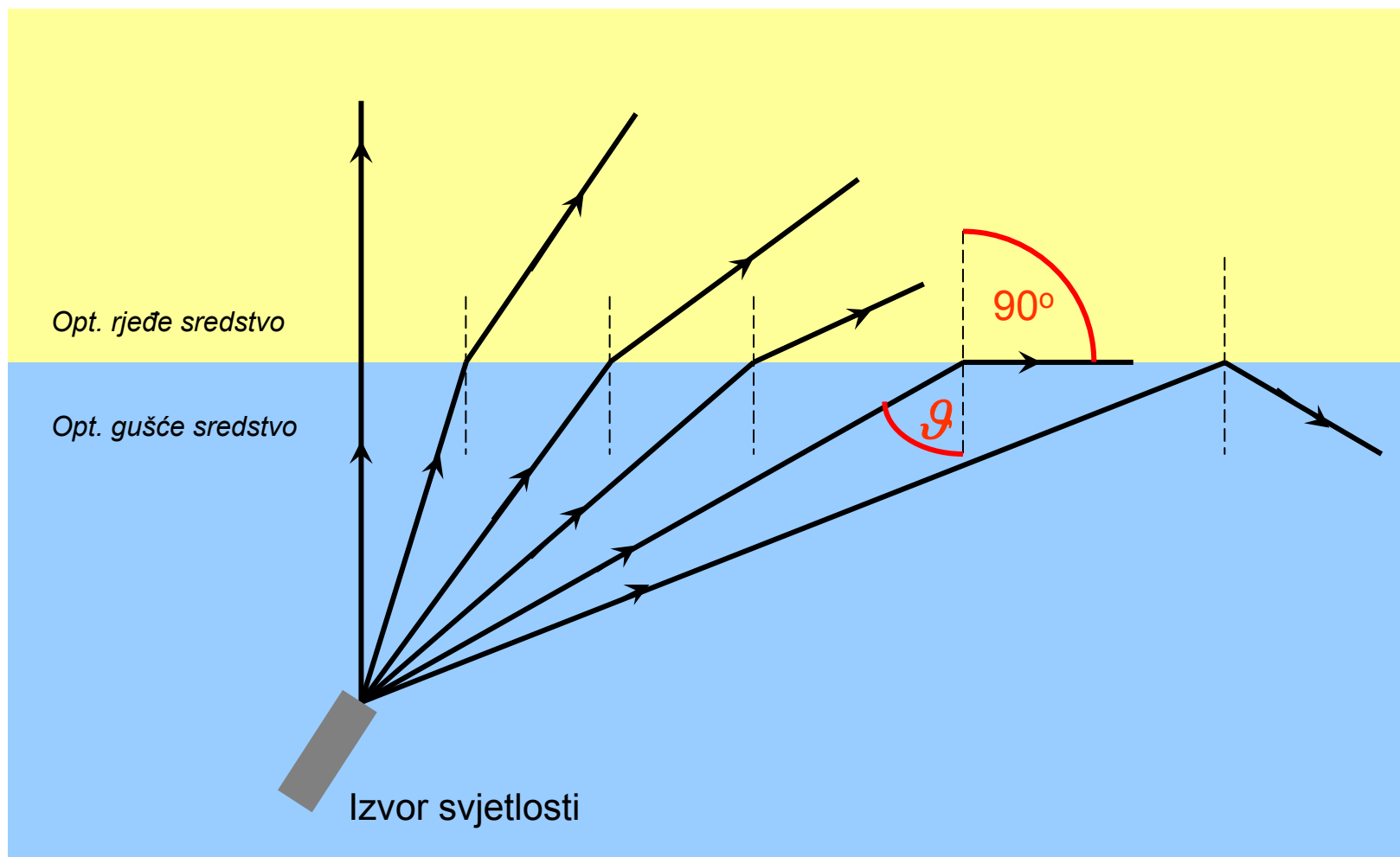
$$\vartheta_p < \vartheta_c$$

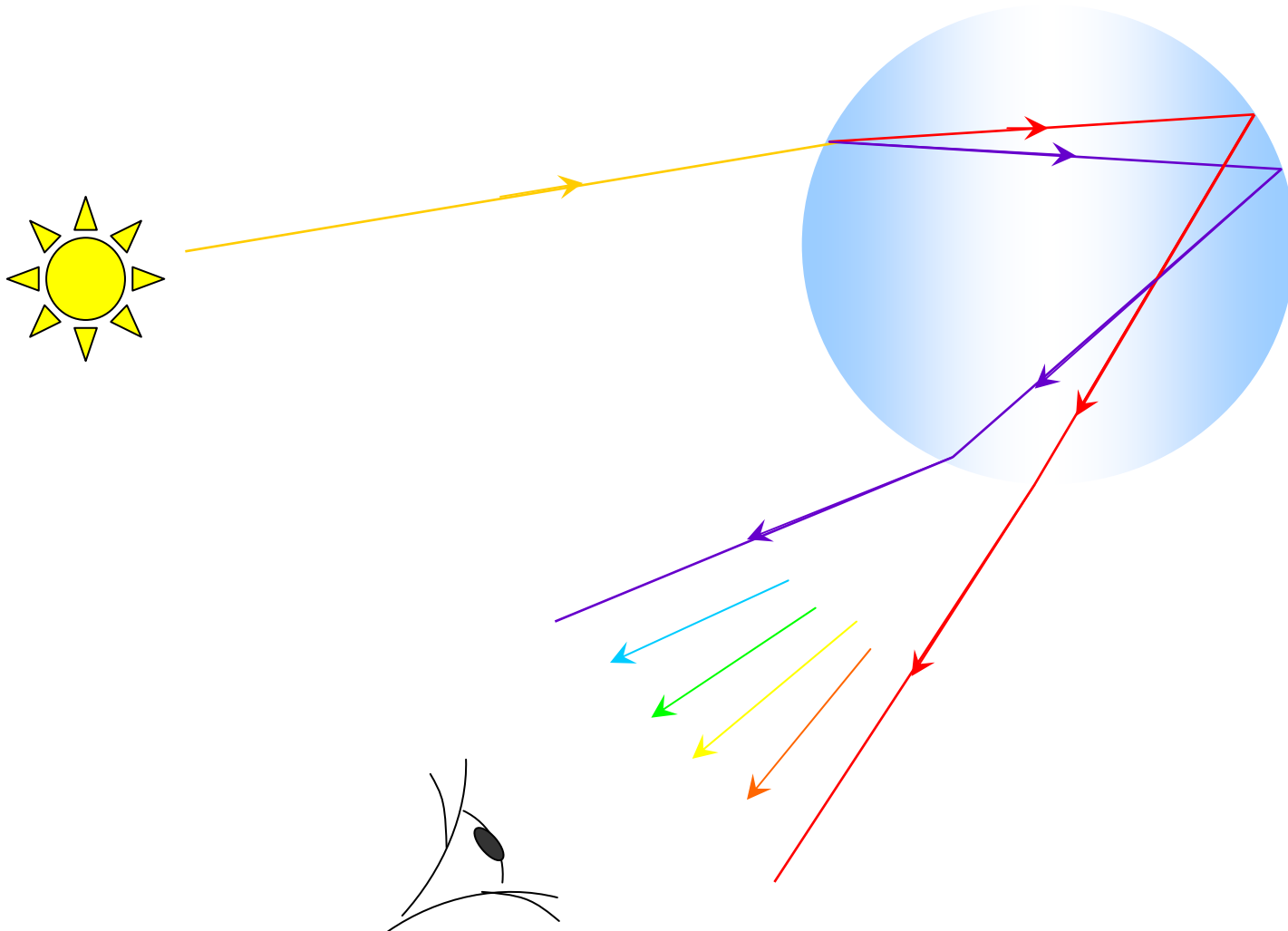


$$\vartheta_p > \vartheta_c$$

Crvena svjetlost se uvijek lomi manje od plave
(koncept – veća valna duljina je manje “osjetljiva”)

Potpuno odbijanje ili totalna refleksija svjetlosti





.. dospjeva do oka motritelja.. Motritelj vidi dugu ako stoji između Sunca i kapljica kiše !