```
(* vstupni stav v H/V bazi - R polarizace *)

In[∘]:= s = 1 / Sqrt[2] {1, I}
```
Out[∘]= $\left\{\frac{1}{\sqrt{2}}, \frac{i}{\sqrt{2}}\right\}$

```
(* retardace v H/V bazi, tj rotace v R/D rovine *)

In[∘]:= ret = {{1, 0}, {0, Exp[I ϕ]}}
```
Out[∘]= $\left\{\{1, 0\}, \left\{0, e^{i\,\phi}\right\}\right\}$

```
In[∘]:= (* inverzni operace *)

In[∘]:= retinv = {{1, 0}, {0, Exp[-I ϕ]}}
```
Out[∘]= $\left\{\{1, 0\}, \left\{0, e^{-i\,\phi}\right\}\right\}$

```
In[∘]:= (* referencni vystup - L polarizace *)

In[∘]:= sout1 = Simplify[(ret /. ϕ → π).s]
```
Out[∘]= $\left\{\frac{1}{\sqrt{2}}, -\frac{i}{\sqrt{2}}\right\}$

```
In[∘]:= s.Conjugate[sout1]

Out[∘]= 0

(* rotace v H/V bazi, tj rotace v H/D rovine  *)

In[∘]:= rot = {{Cos[α], -Sin[α]}, {Sin[α], Cos[α]}}

Out[∘]= {{Cos[α], -Sin[α]}, {Sin[α], Cos[α]}}

In[∘]:= rotinv = {{Cos[α], Sin[α]}, {-Sin[α], Cos[α]}}

Out[∘]= {{Cos[α], Sin[α]}, {-Sin[α], Cos[α]}}

In[∘]:= Simplify[rot.rotinv]

Out[∘]= {{1, 0}, {0, 1}}

(* retardace v rotovane H/V bazi,
tj rotace v rovine nejakeho poledniku spojujiciho R a L *)

In[∘]:= rotret = Simplify[rotinv.ret.rot]
```
Out[∘]= $\left\{\left\{\mathrm{Cos}[\alpha]^2 + e^{i\,\phi}\,\mathrm{Sin}[\alpha]^2, \left(-1 + e^{i\,\phi}\right)\mathrm{Cos}[\alpha]\,\mathrm{Sin}[\alpha]\right\}, \left\{\left(-1 + e^{i\,\phi}\right)\mathrm{Cos}[\alpha]\,\mathrm{Sin}[\alpha], e^{i\,\phi}\,\mathrm{Cos}[\alpha]^2 + \mathrm{Sin}[\alpha]^2\right\}\right\}$

```
In[∘]:= rotretinv = Simplify[rotinv.retinv.rot]
```
Out[∘]= $\left\{\left\{\mathrm{Cos}[\alpha]^2 + e^{-i\,\phi}\,\mathrm{Sin}[\alpha]^2, \left(-1 + e^{-i\,\phi}\right)\mathrm{Cos}[\alpha]\,\mathrm{Sin}[\alpha]\right\}, \left\{\left(-1 + e^{-i\,\phi}\right)\mathrm{Cos}[\alpha]\,\mathrm{Sin}[\alpha], e^{-i\,\phi}\,\mathrm{Cos}[\alpha]^2 + \mathrm{Sin}[\alpha]^2\right\}\right\}$

In[∘]:= `Simplify[rotretinv.rotret]`

Out[∘]= {{1, 0}, {0, 1}}

In[∘]:= `Simplify[rotret.rotretinv]`

Out[∘]= {{1, 0}, {0, 1}}

In[∘]:= `Simplify[ret.retinv]`

Out[∘]= {{1, 0}, {0, 1}}

In[∘]:= `(* vystupni stav *)`

In[∘]:= `sout2 = Simplify[rotret.s]`

Out[∘]= $\left\{\frac{(\text{Cos}[\alpha] - i\,\text{Sin}[\alpha])\,(\text{Cos}[\alpha] + i\,e^{i\,\phi}\,\text{Sin}[\alpha])}{\sqrt{2}}, \frac{(e^{i\,\phi}\,\text{Cos}[\alpha] + i\,\text{Sin}[\alpha])\,(i\,\text{Cos}[\alpha] + \text{Sin}[\alpha])}{\sqrt{2}}\right\}$

In[∘]:= `sout1`

Out[∘]= $\left\{\frac{1}{\sqrt{2}}, -\frac{i}{\sqrt{2}}\right\}$

In[∘]:= `(* specialni pripad *)`

In[∘]:= `sout2spec = Simplify[sout2 /. {ϕ → π, α → π / 4}]`

Out[∘]= $\left\{-\frac{i}{\sqrt{2}}, -\frac{1}{\sqrt{2}}\right\}$

In[∘]:= `sout2spec / sout1`

Out[∘]= $\{-i, -i\}$

In[∘]:= `(* geometricka faze *)`

In[∘]:= `Arg[sout2spec / sout1]`

Out[∘]= $\left\{-\frac{\pi}{2}, -\frac{\pi}{2}\right\}$

`(* rotace po obecnem poledniku *)`

In[∘]:= `sout2obec = Simplify[sout2 /. {ϕ → π}]`

Out[∘]= $\left\{\frac{(\text{Cos}[\alpha] - i\,\text{Sin}[\alpha])^2}{\sqrt{2}}, -\frac{i\,(\text{Cos}[\alpha] - i\,\text{Sin}[\alpha])^2}{\sqrt{2}}\right\}$

In[∘]:= `(* geometricka faze = 2α *)`

In[∘]:= `FullSimplify[sout2obec / sout1]`

Out[∘]= $\left\{e^{-2\,i\,\alpha}, e^{-2\,i\,\alpha}\right\}$

`(* dokonceni cyklu R→L→R rotaci sout1 po draze sout2spec → s *)`

In[∘]:=
```
sout3 = Simplify[rotretinv.sout1]
```

Out[∘]=

$$\left\{\frac{e^{-i\phi}\left(e^{i\phi}\,\mathrm{Cos}[\alpha]-i\,\mathrm{Sin}[\alpha]\right)\left(\mathrm{Cos}[\alpha]+i\,\mathrm{Sin}[\alpha]\right)}{\sqrt{2}},\ \frac{e^{-i\phi}\left(-i\,\mathrm{Cos}[\alpha]+\mathrm{Sin}[\alpha]\right)\left(\mathrm{Cos}[\alpha]-i\,e^{i\phi}\,\mathrm{Sin}[\alpha]\right)}{\sqrt{2}}\right\}$$

In[∘]:=
```
s
```

Out[∘]=

$$\left\{\frac{1}{\sqrt{2}},\ \frac{i}{\sqrt{2}}\right\}$$

In[∘]:=
```
sout3fin = Simplify[sout3 /. {ϕ → π, α → π / 4}]
```

Out[∘]=

$$\left\{\frac{i}{\sqrt{2}},\ -\frac{1}{\sqrt{2}}\right\}$$

In[∘]:=
```
Simplify[sout3fin / s]
```

Out[∘]= $\{i,\ i\}$

In[∘]:=
```
(* geometricka faze *)
```

In[∘]:=
```
Arg[sout3fin / s]
```

Out[∘]=

$$\left\{\frac{\pi}{2},\ \frac{\pi}{2}\right\}$$