

### Loading older invariants

(Alt) In[ ]:=

```
SetDirectory["C:\\drorbn\\AcademicPensieve\\Talks\\KnotTheoryCongress-2502"]
```

(Alt) Out[ ]:=

C:\\drorbn\\AcademicPensieve\\Talks\\KnotTheoryCongress-2502

(Alt) In[ ]:=

```
os = Get["../Projects/HigherRank/Data/theta3-15.m"]
```

(Alt) Out[ ]:=

$$\left\{ \text{Knot}[3, 1] \rightarrow \left\{ \frac{1-T+T^2}{T}, -\frac{1-T_1+T_1^2-T_2-T_1^3 T_2+T_2^2+T_1^4 T_2^2-T_1 T_2^3-T_1^4 T_2^3+T_1^2 T_2^4-T_1^3 T_2^4+T_1^4 T_2^4}{T_1^2 T_2^2} \right\}, \right.$$

$$\text{Knot}[4, 1] \rightarrow \left\{ -\frac{1-3 T+T^2}{T}, 0 \right\}, \text{Knot}[5, 1] \rightarrow \left\{ \frac{1-T+T^2-T^3+T^4}{T^2}, -\frac{2-2 T_1+\dots 50 \dots+2 T_1^8 T_2^8}{T_1^4 T_2^4} \right\}, \dots 313 224 \dots,$$

$$\text{Knot}[15, \text{NonAlternating}, 168 028] \rightarrow \left\{ -\frac{\dots 1 \dots}{T^5}, \dots 1 \dots \right\}, \text{Knot}[15, \text{NonAlternating}, 168 029] \rightarrow$$

$$\left\{ -\frac{(1-T+T^2)^2 (4-12 T+15 T^2-12 T^3+4 T^4)}{T^4}, -\frac{2 \dots 3 \dots (32-126 T_1+\dots 169 \dots+246 T_1^{10} T_2^{12}-126 T_1^{11} T_2^{12}+32 T_1^{12} T_2^{12})}{T_1^8 T_2^8} \right\},$$

$$\text{Knot}[15, \text{NonAlternating}, 168 030] \rightarrow \left\{ \frac{(1-T+T^2) (1-12 T+35 T^2-47 T^3+35 T^4-12 T^5+T^6)}{T^4}, \frac{1}{T_1^8 T_2^8} (2-26 T_1+96 T_1^2-188 T_1^3+234 T_1^4-188 T_1^5+96 T_1^6-26 T_1^7+2 T_1^8-26 T_2+318 T_1 T_2-928 T_1^2 T_2+\dots 303 \dots+318 T_1^{15} T_2^{15}-26 T_1^{16} T_2^{15}+2 T_1^8 T_2^{16}-26 T_1^9 T_2^{16}+96 T_1^{10} T_2^{16}-188 T_1^{11} T_2^{16}+234 T_1^{12} T_2^{16}-188 T_1^{13} T_2^{16}+96 T_1^{14} T_2^{16}-26 T_1^{15} T_2^{16}+2 T_1^{16} T_2^{16}) \right\} \right\}$$

Full expression not available (original memory size: 16.5 GB)

(Alt) In[ ]:=

```
Length[os]
```

(Alt) Out[ ]:=

313 230

(Alt) In[ ]:=

```
Length[Hs = Get["../Projects/HigherRank/Data/HOMFLYPT3-15.m"]]
```

(Alt) Out[ ]:=

313 230

(Alt) In[ ]:=

```
Length[Khs = Get["../Projects/HigherRank/Data/Kh3-15.m"]]
```

(Alt) Out[ ]:=

313 230

(Alt) In[ ]:=

```
HKhs = MapThread[{#1[[1]] -> Expand@{#1[[2]], #2[[2]]} &, {Hs, Khs}]
```

(Alt) Out[ ]:=

$$\left\{ \text{Knot}[3, 1] \rightarrow \left\{ 2 a^2 - a^4 + a^2 z^2, \frac{1}{q^3} + \frac{1}{q} + \frac{1}{q^3 t^3} + \frac{1}{q^3 t^2} \right\}, \dots 313 228 \dots, \text{Knot}[15, \text{NonAlternating}, 168 030] \rightarrow \right.$$

$$\left\{ 4 + \frac{3}{a^4} - \frac{6}{a^2} + 7 z^2 - \frac{z^2}{a^{10}} + \frac{4 z^2}{a^8} - \frac{3 z^2}{a^6} + \frac{5 z^2}{a^4} - \frac{15 z^2}{a^2} + 3 z^4 + \frac{3 z^4}{a^8} - \frac{6 z^4}{a^6} + \frac{3 z^4}{a^4} - \frac{13 z^4}{a^2} - \frac{3 z^6}{a^6} + \frac{2 z^6}{a^4} - \frac{4 z^6}{a^2} + \frac{z^8}{a^4}, \right.$$

$$28 q^3 + 21 q^5 + \frac{3}{q^5 t^4} + \frac{6}{q^3 t^3} + \frac{3}{q t^3} + \frac{14}{q t^2} + \frac{6 q}{t^2} + \frac{20 q}{t} + \frac{14 q^3}{t} + 32 q^5 t + 27 q^7 t + 32 q^7 t^2 + 32 q^9 t^2 + 29 q^9 t^3 + 32 q^{11} t^3 +$$

$$23 q^{11} t^4 + 29 q^{13} t^4 + 15 q^{13} t^5 + 23 q^{15} t^5 + 8 q^{15} t^6 + 15 q^{17} t^6 + 4 q^{17} t^7 + 8 q^{19} t^7 + q^{19} t^8 + 4 q^{21} t^8 + q^{23} t^9 \left. \right\}$$

Full expression not available (original memory size: 3.2 GB)

(Alt) In[ ]:=

```
HKhes = MapThread [ (#1 [[1]] → Expand@ {#1 [[2]], #2 [[2]]) &, {HKhs, es} ]
```

(Alt) Out[ ]:=

$$\left\{ \text{Knot}[3, 1] \rightarrow \left\{ \left\{ 2a^2 - a^4 + a^2 z^2, \frac{1}{q^3} + \frac{1}{q} + \frac{1}{q^3 t^3} + \frac{1}{q^5 t^2} \right\}, \right. \right.$$

$$\left. \left\{ -1 + \frac{1}{T} + T, -\frac{1}{T^2} - T^2 - \frac{1}{T^2} - \frac{1}{T^2 T^2} + \frac{1}{T_1 T_2^2} + \frac{1}{T_1^2 T_2} + \frac{1}{T_2} + \frac{T_1}{T_1} + \frac{T_2}{T_1} + T_1^2 T_2 - T_2^2 + T_1 T_2^2 - T_1^2 T_2^2 \right\}, \right.$$

$$\left. \dots 313 228 \dots, \text{Knot}[15, \text{NonAlternating}, 168 030] \rightarrow \right.$$

$$\left\{ \left\{ 4 + \frac{3}{a^4} - \frac{6}{a^2} + 7z^2 - \frac{z^2}{a^{10}} + \frac{4z^2}{a^8} - \frac{3z^2}{a^6} + \frac{5z^2}{a^4} - \frac{15z^2}{a^2} + 3z^4 + \frac{3z^4}{a^8} - \frac{6z^4}{a^6} + \frac{3z^4}{a^4} - \frac{13z^4}{a^2} - \frac{3z^6}{a^6} + \frac{2z^6}{a^4} - \frac{4z^6}{a^2} + \frac{z^8}{a^4}, \right. \right.$$

$$28q^3 + 21q^5 + \frac{3}{q^3 t^4} + \frac{6}{q^3 t^3} + \frac{3}{q t^3} + \frac{14}{q t^2} + \frac{6q}{t^2} + \frac{20q}{t} + \frac{14q^3}{t} + 32q^5 t + \dots 6 \dots + 29q^{13} t^4 + 15q^{13} t^5 +$$

$$23q^{15} t^5 + 8q^{15} t^6 + 15q^{17} t^6 + 4q^{17} t^7 + 8q^{19} t^7 + q^{19} t^8 + 4q^{21} t^8 + q^{23} t^9, \left. \left\{ \dots 1 \dots \right\} \right\}$$

Full expression not available (original memory size: 18.9 GB)

## Loading ρ2

(Alt) In[ ]:=

```
ρ2s = Join@@ (Get["Rho2Data/" <> #] & /@  
{"Rho2_3-10.m", "Rho2_11.m", "Rho2_12.m", "Rho2_13.m", "Rho2_14.m", "Rho2_15.m"})
```

(Alt) Out[ ]:=

$$\left\{ \text{Knot}[3, 1] \rightarrow 2 - 4z^2 + 3z^4 + 4z^6 + z^8, \text{Knot}[4, 1] \rightarrow -2 + 2z^4, \dots 313 226 \dots, \right.$$

$$\text{Knot}[15, \text{NonAlternating}, 168 029] \rightarrow -4 - 80z^2 + 72z^4 + 1336z^6 + 8362z^8 + 34376z^{10} + 78490z^{12} + 101904z^{14} +$$

$$84392z^{16} + 73752z^{18} + 104746z^{20} + 133184z^{22} + 111766z^{24} + 59512z^{26} + 19424z^{28} + 3552z^{30} + 288z^{32},$$

$$\text{Knot}[15, \text{NonAlternating}, 168 030] \rightarrow -6 - 68z^2 + 353z^4 + 1108z^6 + 5652z^8 + 7548z^{10} - 7105z^{12} +$$

$$11640z^{14} + 84799z^{16} + 95792z^{18} + 24642z^{20} - 11836z^{22} - 2677z^{24} + 1880z^{26} + 346z^{28} - 80z^{30} + 4z^{32} \left. \right\}$$

Full expression not available (original memory size: 0.8 GB)

(Alt) In[ ]:=

```
Length[ρ2s]
```

(Alt) Out[ ]:=

313 230

(Alt) In[ ]:=

```
ρp2s = MapThread [ (#1 [[1]] → Expand@ {#1 [[2]], #2 [[2]]) &, {Take[es, Length[ρ2s]], ρ2s} ]
```

(Alt) Out[ ]:=

$$\left\{ \text{Knot}[3, 1] \rightarrow \right.$$

$$\left\{ \left\{ -1 + \frac{1}{T} + T, -\frac{1}{T^2} - T^2 - \frac{1}{T^2} - \frac{1}{T^2 T^2} + \frac{1}{T_1 T_2^2} + \frac{1}{T_1^2 T_2} + \frac{1}{T_2} + \frac{T_1}{T_1} + \frac{T_2}{T_1} + T_1^2 T_2 - T_2^2 + T_1 T_2^2 - T_1^2 T_2^2 \right\}, 2 - 4z^2 + 3z^4 + 4z^6 + z^8 \right\},$$

$$\text{Knot}[4, 1] \rightarrow \left\{ \dots 1 \dots \right\}, \dots 313 226 \dots, \dots 1 \dots, \text{Knot}[15, \text{NonAlternating}, 168 030] \rightarrow$$

$$\left\{ \left\{ 117 + \frac{1}{T^4} - \frac{13}{T^3} + \frac{48}{T^2} - \frac{94}{T} - 94T + 48T^2 - 13T^3 + T^4, 270060 + \frac{2}{T^{18}} + \frac{318}{T^{17}} + \frac{528}{T^{16}} - \frac{22644}{T^{15}} - \frac{11209}{T^{14}} + \frac{101444}{T^{13}} - \frac{62759}{T^{12}} - \right. \right.$$

$$\frac{116830}{T} - 116830T - 62759T^2 + \dots 304 \dots + 318T^{17}T^2 - 26T^{18}T^2 + 2T^{28} - 26T^{18}T^2 + 96T^{12}T^2 -$$

$$188T^{13}T^2 + 234T^{14}T^2 - 188T^{15}T^2 + 96T^{16}T^2 - 26T^{17}T^2 + 2T^{18}T^2 \left. \right\}, -6 - 68z^2 + \dots 18 \dots + 4z^{32} \left. \right\}$$

Full expression not available (original memory size: 16.6 GB)

(Alt) In[ ]:=

**Kh $\theta$  $\rho$ 2s** = MapThread [ ( #1 [[1]]  $\rightarrow$  Expand@ { #1 [[2]], #2 [[2]] } ) &, { Take [Khs, Length@ $\theta\rho$ 2s],  $\theta\rho$ 2s ]

(Alt) Out[ ]:=

$$\left\{ \text{Knot}[3, 1] \rightarrow \left\{ \frac{1}{q^3} + \frac{1}{q} + \frac{1}{q^9 t^3} + \frac{1}{q^5 t^2}, \left\{ \left\{ -1 + \frac{1}{T} + T, -\frac{1}{T^2} - T^2 - \frac{1}{T^2} - \frac{1}{T^2 T^2} + \frac{1}{T_1 T^2} + \frac{1}{T_1^2 T_2} + \frac{T_1}{T_2} + \frac{T_2}{T_1} + T_1^2 T_2 - T_2^2 + T_1 T_2^2 - T_1^2 T_2^2 \right\}, 2 - 4 z^2 + 3 z^4 + 4 z^6 + z^8 \right\} \right\},$$

... 313 228 ... , Knot [15, NonAlternating, 168 030]  $\rightarrow$

$$\left\{ 28 q^3 + 21 q^5 + \frac{3}{q^5 t^4} + \frac{6}{q^3 t^3} + \frac{3}{q t^3} + \frac{14}{q t^2} + \frac{6 q}{t^2} + \frac{20 q}{t} + \frac{14 q^3}{t} + 32 q^5 t + 27 q^7 t + 32 q^7 t^2 + 32 q^9 t^2 + 29 q^9 t^3 + 32 q^{11} t^3 + 23 q^{11} t^4 + 29 q^{13} t^4 + 15 q^{13} t^5 + 23 q^{15} t^5 + 8 q^{15} t^6 + 15 q^{17} t^6 + 4 q^{17} t^7 + 8 q^{19} t^7 + q^{19} t^8 + 4 q^{21} t^8 + q^{23} t^9, \left\{ \left\{ 117 + \frac{1}{T^4} - \frac{13}{T^3} + \frac{48}{T^2} - \frac{94}{T} - 94 T + 48 T^2 - 13 T^3 + T^4, 270 060 + \frac{2}{T_1^8} + \frac{318}{T_1^7} + \frac{528}{T_1^6} - \frac{22 644}{T_1^5} - \frac{11 209}{T_1^4} + \dots 322 \dots + 234 T_1^4 T_2^8 - 188 T_1^5 T_2^8 + 96 T_1^6 T_2^8 - 26 T_1^7 T_2^8 + 2 T_1^8 T_2^8 \right\}, \dots 21 \dots + 4 \dots 1 \dots \right\} \right\}$$

Full expression not available (original memory size: 18.5 GB)

(Alt) In[ ]:=

**H $\theta$  $\rho$ 2s** = MapThread [ ( #1 [[1]]  $\rightarrow$  Expand@ { #1 [[2]], #2 [[2]] } ) &, { Take [Hs, Length@ $\theta\rho$ 2s],  $\theta\rho$ 2s ]

(Alt) Out[ ]:=

$$\left\{ \text{Knot}[3, 1] \rightarrow \left\{ 2 a^2 - a^4 + a^2 z^2, \left\{ \left\{ -1 + \frac{1}{T} + T, -\frac{1}{T^2} - T^2 - \frac{1}{T^2} - \frac{1}{T^2 T^2} + \frac{1}{T_1 T^2} + \frac{1}{T_1^2 T_2} + \frac{T_1}{T_2} + \frac{T_2}{T_1} + T_1^2 T_2 - T_2^2 + T_1 T_2^2 - T_1^2 T_2^2 \right\}, 2 - 4 z^2 + 3 z^4 + 4 z^6 + z^8 \right\} \right\},$$

... 313 228 ... , Knot [15, NonAlternating, 168 030]  $\rightarrow$

$$\left\{ 4 + \frac{3}{a^4} - \frac{6}{a^2} + 7 z^2 - \frac{z^2}{a^{10}} + \frac{4 z^2}{a^8} - \frac{3 z^2}{a^6} + \frac{5 z^2}{a^4} - \frac{15 z^2}{a^2} + 3 z^4 + \frac{3 z^4}{a^8} - \frac{6 z^4}{a^6} + \frac{3 z^4}{a^4} - \frac{13 z^4}{a^2} - \frac{3 z^6}{a^6} + \frac{2 z^6}{a^4} - \frac{4 z^6}{a^2} + \frac{z^8}{a^4}, \left\{ \left\{ 117 + \frac{1}{T^4} - \frac{13}{T^3} + \frac{48}{T^2} - \frac{94}{T} - 94 T + 48 T^2 - 13 T^3 + T^4, 270 060 + \frac{2}{T_1^8} + \frac{318}{T_1^7} + \frac{528}{T_1^6} - \frac{22 644}{T_1^5} - \frac{11 209}{T_1^4} + \frac{101 444}{T_1^3} - \frac{62 759}{T_1^2} - \frac{116 830}{T_1} - 116 830 T_1 - 62 759 T_1^2 + \dots 304 \dots + 318 T_1^7 T_2^7 - 26 T_1^8 T_2^7 + 2 T_2^8 - 26 T_1 T_2^8 + 96 T_1^2 T_2^8 - 188 T_1^3 T_2^8 + 234 T_1^4 T_2^8 - 188 T_1^5 T_2^8 + 96 T_1^6 T_2^8 - 26 T_1^7 T_2^8 + 2 T_1^8 T_2^8 \right\}, \dots 21 \dots + 4 \dots 1 \dots \right\} \right\}$$

Full expression not available (original memory size: 17.9 GB)

(Alt) In[ ]:=

**HK $\theta$  $\rho$ 2s** = MapThread [ ( #1 [[1]]  $\rightarrow$  Expand@ { #1 [[2]], #2 [[2]] } ) &, { Take [HKhs, Length@ $\theta\rho$ 2s],  $\theta\rho$ 2s ]

(Alt) Out[ ]:=

$$\left\{ \text{Knot}[3, 1] \rightarrow \left\{ \left\{ 2 a^2 - a^4 + a^2 z^2, \frac{1}{q^3} + \frac{1}{q} + \frac{1}{q^9 t^3} + \frac{1}{q^5 t^2} \right\}, \left\{ \left\{ -1 + \frac{1}{T} + T, -\frac{1}{T^2} - T^2 - \frac{1}{T^2} - \frac{1}{T^2 T^2} + \frac{1}{T_1 T^2} + \frac{1}{T_1^2 T_2} + \frac{T_1}{T_2} + \frac{T_2}{T_1} + T_1^2 T_2 - T_2^2 + T_1 T_2^2 - T_1^2 T_2^2 \right\}, 2 - 4 z^2 + 3 z^4 + 4 z^6 + z^8 \right\} \right\},$$

... 313 228 ... , Knot [15, NonAlternating, 168 030]  $\rightarrow$

$$\left\{ \left\{ 4 + \frac{3}{a^4} - \frac{6}{a^2} + 7 z^2 - \frac{z^2}{a^{10}} + \frac{4 z^2}{a^8} - \frac{3 z^2}{a^6} + \frac{5 z^2}{a^4} - \frac{15 z^2}{a^2} + 3 z^4 + \frac{3 z^4}{a^8} - \frac{6 z^4}{a^6} + \frac{3 z^4}{a^4} - \frac{13 z^4}{a^2} - \frac{3 z^6}{a^6} + \frac{2 z^6}{a^4} - \frac{4 z^6}{a^2} + \frac{z^8}{a^4}, 28 q^3 + 21 q^5 + \frac{3}{q^5 t^4} + \frac{6}{q^3 t^3} + \frac{3}{q t^3} + \frac{14}{q t^2} + \frac{6 q}{t^2} + \frac{20 q}{t} + \frac{14 q^3}{t} + 32 q^5 t + \dots 6 \dots + 29 q^{13} t^4 + 15 q^{13} t^5 + 23 q^{15} t^5 + 8 q^{15} t^6 + 15 q^{17} t^6 + 4 q^{17} t^7 + 8 q^{19} t^7 + q^{19} t^8 + 4 q^{21} t^8 + q^{23} t^9 \right\}, \left\{ \dots 1 \dots \right\} \right\}$$

Full expression not available (original memory size: 19.7 GB)

## Stats

(Alt) In[ ]:=

```
Stats[n_] := Column@Module[{a, b}, {
  {"Knots", a = Length@Select[es, #[[1, 1]] ≤ n &]},
  {"(H,Kh)", b = Length@Union@Expand[Last /@ Select[HKhs, #[[1, 1]] ≤ n &]], b - a},
  {"(Δ,ρ1)",
  b = Length@Union@Expand[Last /@ Select[es, #[[1, 1]] ≤ n &] /. T2 → 1], b - a},
  {"(Θ)", b = Length@Union@Expand[Last /@ Select[es, #[[1, 1]] ≤ n &]], b - a},
  {"(Θ,ρ2)", b = Length@Union@Expand[Last /@ Select[θρ2s, #[[1, 1]] ≤ n &]], b - a},
  {"(H,Kh,Θ)", b = Length@Union@Expand[Last /@ Select[HKhθs, #[[1, 1]] ≤ n &]], b - a},
  {"(Kh,Θ,ρ2)", b = Length@Union@Expand[Last /@ Select[Khθρ2s, #[[1, 1]] ≤ n &]], b - a},
  {"(H,Θ,ρ2)", b = Length@Union@Expand[Last /@ Select[Hθρ2s, #[[1, 1]] ≤ n &]], b - a},
  {"(H,Kh,Θ,ρ2)",
  b = Length@Union@Expand[Last /@ Select[HKhθρ2s, #[[1, 1]] ≤ n &]], b - a}
}]
```

(Alt) In[ ]:=

**Stats[10]**

(Alt) Out[ ]=

```
{Knots, 249}
{(H,Kh), 248, -1}
{(Δ,ρ1), 249, 0}
{(Θ), 249, 0}
{(Θ,ρ2), 249, 0}
{(H,Kh,Θ), 249, 0}
{(Kh,Θ,ρ2), 249, 0}
{(H,Θ,ρ2), 249, 0}
{(H,Kh,Θ,ρ2), 249, 0}
```

(Alt) In[ ]:=

**Stats[11]**

(Alt) Out[ ]=

```
{Knots, 801}
{(H,Kh), 771, -30}
{(Δ,ρ1), 787, -14}
{(Θ), 798, -3}
{(Θ,ρ2), 798, -3}
{(H,Kh,Θ), 798, -3}
{(Kh,Θ,ρ2), 798, -3}
{(H,Θ,ρ2), 798, -3}
{(H,Kh,Θ,ρ2), 798, -3}
```

$(Alt) In[]:=$ **Stats [12]** $(Alt) Out[]:=$ 

```
{Knots, 2977}
{ (H,Kh), 2763, -214}
{ ( $\Delta$ , $\rho_1$ ), 2882, -95}
{ ( $\Theta$ ), 2958, -19}
{ ( $\Theta$ , $\rho_2$ ), 2967, -10}
{ (H,Kh, $\Theta$ ), 2959, -18}
{ (Kh, $\Theta$ , $\rho_2$ ), 2967, -10}
{ (H, $\Theta$ , $\rho_2$ ), 2967, -10}
{ (H,Kh, $\Theta$ , $\rho_2$ ), 2967, -10}
```

 $(Alt) In[]:=$ **Stats [13]** $(Alt) Out[]:=$ 

```
{Knots, 12965}
{ (H,Kh), 11194, -1771}
{ ( $\Delta$ , $\rho_1$ ), 12006, -959}
{ ( $\Theta$ ), 12771, -194}
{ ( $\Theta$ , $\rho_2$ ), 12796, -169}
{ (H,Kh, $\Theta$ ), 12780, -185}
{ (Kh, $\Theta$ , $\rho_2$ ), 12796, -169}
{ (H, $\Theta$ , $\rho_2$ ), 12796, -169}
{ (H,Kh, $\Theta$ , $\rho_2$ ), 12796, -169}
```

 $(Alt) In[]:=$ **Stats [14]** $(Alt) Out[]:=$ 

```
{Knots, 59937}
{ (H,Kh), 49149, -10788}
{ ( $\Delta$ , $\rho_1$ ), 53684, -6253}
{ ( $\Theta$ ), 58819, -1118}
{ ( $\Theta$ , $\rho_2$ ), 58955, -982}
{ (H,Kh, $\Theta$ ), 58875, -1062}
{ (Kh, $\Theta$ , $\rho_2$ ), 58956, -981}
{ (H, $\Theta$ , $\rho_2$ ), 58955, -982}
{ (H,Kh, $\Theta$ , $\rho_2$ ), 58956, -981}
```

 $(Alt) In[]:=$ **Stats [15]** $(Alt) Out[]:=$ 

```
{Knots, 313230}
{ (H,Kh), 242985, -70245}
{ ( $\Delta$ , $\rho_1$ ), 270316, -42914}
{ ( $\Theta$ ), 306472, -6758}
{ ( $\Theta$ , $\rho_2$ ), 306889, -6341}
{ (H,Kh, $\Theta$ ), 306675, -6555}
{ (Kh, $\Theta$ , $\rho_2$ ), 306893, -6337}
{ (H, $\Theta$ , $\rho_2$ ), 306889, -6341}
{ (H,Kh, $\Theta$ , $\rho_2$ ), 306893, -6337}
```