

Pensieve header: Playing near ρ_1 .

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In[ ]:= SetDirectory["C:\\drorbn\\AcademicPensieve\\Projects\\APAI"];
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In[ ]:= Once[<< KnotTheory` ; << Rot.m];
```

```
In[ ]:= R1[s_, i_, j_] := s (g_{j^+,j} + g_{j^+,j^*} - g_{ij}) - g_{ii} (g_{j^+,j^*} - 1) - 1 / 2);
rho[K_] := Module[{Cs, phi, n, A, s, i, j, k, Delta, G, rho1},
  {Cs, phi} = Rot[K]; n = Length[Cs];
  A = IdentityMatrix[2 n + 1];
  Cases[Cs, {s_, i_, j_} -> (A[[{i, j}, {i + 1, j + 1}]] += ( -T^S T^S - 1 ))];
  Delta = T^(-Total[phi] - Total[Cs[[All, 1]]) / 2) Det[A];
  G = Inverse[A];
  rho1 = Sum_{k=1}^n R1 @@ Cs[[k]] - Sum_{k=1}^{2^n} phi[[k]] (g_{kk} - 1 / 2);
  Factor@{Delta, Delta^2 rho1 /. alpha_+ -> alpha + 1 /. g_{alpha,beta} -> G[[alpha, beta]]};
```

```
In[ ]:= delta_{i,j} := If[i === j, 1, 0];
gRules_{s_,i_,j_} := {g_{i,beta} -> delta_{i,beta} + T^S g_{i^+,beta} + (1 - T^S) g_{j^+,beta}, g_{j,beta} -> delta_{j,beta} + g_{j^+,beta},
  g_{alpha,i} -> T^{-S} (g_{alpha,i^+} - delta_{alpha,i^+}), g_{alpha,j} -> g_{alpha,j^+} - (1 - T^S) g_{alpha,i} - delta_{alpha,j^+}}
(alpha_+)^+ := alpha^{++}; (* this is for cosmetic reasons only *)
```

```
In[ ]:= Simplify[R1[1, i, j] /. gRules_{1,i,j}]
```

Out[]:=

$$-\frac{1}{2} + \frac{(-1 + T) g_{j^+,i^+}^2}{T} - \frac{g_{i^+,i^+} ((-1 + T) g_{j^+,i^+} + T (-1 + g_{j^+,j^+}))}{T} - g_{j^+,i^+} (1 + g_{i^+,j^+} - 2 g_{j^+,j^+})$$

```
In[ ]:= Collect[R1[1, i, j] /. gRules_{1,i,j} /. g_{j^+,beta} -> gt_{beta} + g_{i^+,beta}, gt_, Simplify]
```

Out[]:=

$$-\frac{1}{2} + \frac{(-1 + T) g_{i^+}^2}{T} + g_{t_{j^+}} g_{i^+,i^+} + g_{t_{i^+}} \left(-1 + 2 g_{t_{j^+}} + \frac{(-1 + T) g_{i^+,i^+}}{T} + g_{i^+,j^+} \right)$$