



```
F1[{s_-, i_-, j_-}] := CF[
  S[1/2 - B311 + T1^2 B211 - B111 B211 - (T1^2 - 1) B211 B311 + 2 B211 B311 -
    (1 - T1^2) B211 B311 - B211 B311 - T1^2 B211 B311 + B111 B311 +
    ((T1^2 - 1) B111 (T1^2 B211 - T1^2 B211 + T1^2 B311) +
    (T1^2 - 1) B311 (1 - T1^2 B211 + B211) + (T1^2 - 2) B211 - (T1^2 - 1) (T1^2 + 1) B211)] /
    (T1^2 - 1)]
F2[{s0_-, i0_-, j0_}, {s1_-, i1_-, j1_}] :=
  CF[S2[(T1^2 - 1) (T1^2 - 1)^-1 (T1^2 - 1) B1, j1, i0 B3, j0, i1]
    ((T1^2 - 1) B2, i1, i0 - B2, i1, j0) - (T1^2 - 1) B2, j1, i0 - B2, j1, j0)]
F3[{s_-, i_-, j_-}] = phi B311 - phi / 2;

T3 = T1, T2;
CF[s_] := ExpandCollect[s, B_., F] /. F -> Factor;
O[K_] := O[K] = Module[{X, phi, n, A, delta, G, ev, o, k1, k2},
  {X, phi} = Rot[K]; n = Length[X]; A = IdentityMatrix[2 n + 1];
  Cases[X, {s_-, i_-, j_-} >> {A[[{i, j}], {i + 1, j + 1}]] += {
    -T^i T^j - 1
  }];
  delta = T^(-Total[phi] - Total[phiAll, 1]) / 2 Det[A];
  G = Inverse[A];
  ev[s_] := Factor[s /. B_., delta, phi] >> (G[[s, s]] /. T -> T.);
  o = ev[Sum[F1[X[[k]], {k1, n}]]];
  o += ev[Sum[F2[X[[k1]], X[[k2]], {k1, n}, {k2, n}]]];
  o += ev[Sum[F3[X[[k]], k], {k, Length[o]}]];
  Factor[o (delta /. T -> T1) (delta /. T -> T2) (delta /. T -> T3) o]
];
```

