```
G = SparseArray[{
    {1, 4, 1} → I, {1, 3, 2} → I, {1, 2, 3} → -I, {1, 1, 4} → -I,
    {2, 4, 1} → -1, {2, 3, 2} → 1, {2, 2, 3} → 1, {2, 1, 4} → -1,
    {3, 3, 1} → I, {3, 4, 2} → -I, {3, 1, 3} → -I, {3, 2, 4} → I,
    {4, 4, 2} → 1, {4, 3, 1} → 1, {4, 2, 4} → 1, {4, 1, 3} → 1}];

L = 16; a = -L / 2; b = L / 2 - 1;

C2[t_, m_, p_] := Sum[Exp[-(k0 - q0) t 2 Pi / L], {k0, a + 1 / 2, b + 1 / 2},
  {k1, a, b}, {k2, a, b}, {k3, a, b}, {q0, a + 1 / 2, b + 1 / 2}]


S[k0_, k1_, k2_, k3_, m_] :=
 (I (k0 * G[[1]] + k1 * G[[2]] + k2 * G[[3]] + k3 * G[[4]]) - m * IdentityMatrix[4]) /
  (k0 ^ 2 + k1 ^ 2 + k2 ^ 2 + k3 ^ 2 + m ^ 2)
```