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Magnetic Step Response of 0-Dimensional 1T-$CrTe_2$ Monolayer Nano Magnet with In-Plane Anisotropy Magnetoresistance

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Research Article

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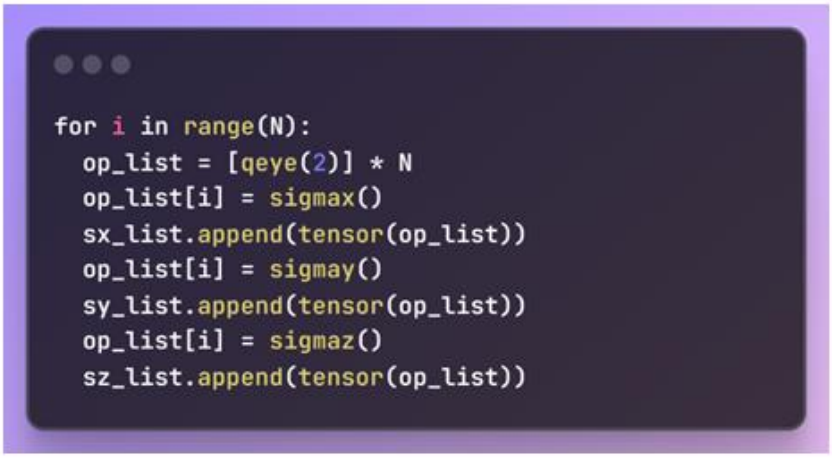
SUPPLEMENTARY DATA

The operators are implemented in Python in Figure 1.

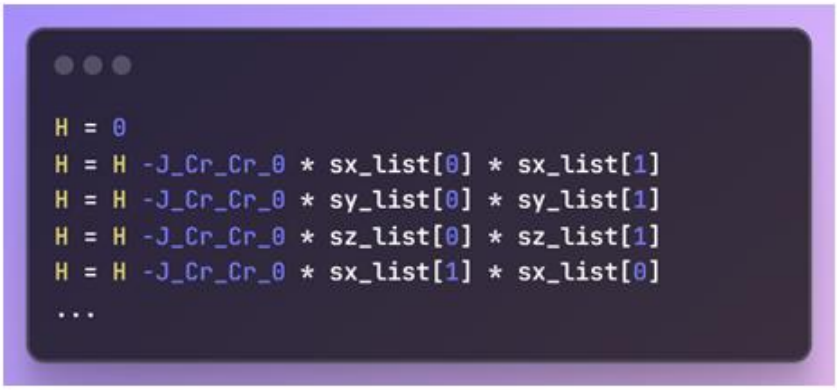
Figure 1. Code implementation of spin operators. N is the number of sites or Cr atom in the cell.



```
for i in range(N):
  op_list = [qeye(2)] * N
  op_list[i] = sigmax()
  sx_list.append(tensor(op_list))
  op_list[i] = sigmay()
  sy_list.append(tensor(op_list))
  op_list[i] = sigmaz()
  sz_list.append(tensor(op_list))
```

The Hamiltonian is implemented in Figure 2.

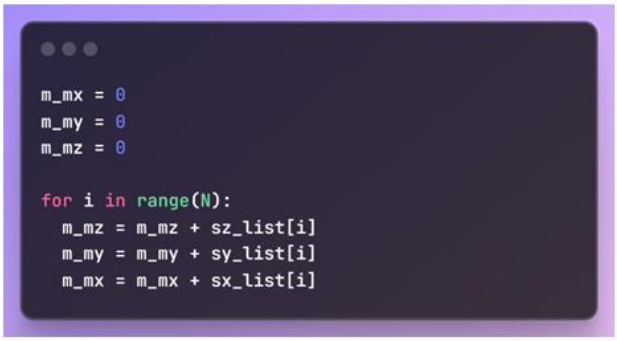
Figure 2. Code implementation of Hamiltonian H operator which is the sum of all first neighbor interactions generated by algorithm. J_Cr_Cr_0 is magnetic coupling parameter.



```
H = 0
H = H -J_Cr_Cr_0 * sx_list[0] * sx_list[1]
H = H -J_Cr_Cr_0 * sy_list[0] * sy_list[1]
H = H -J_Cr_Cr_0 * sz_list[0] * sz_list[1]
H = H -J_Cr_Cr_0 * sx_list[1] * sx_list[0]
...
```

The expectation of magnetization along α is implemented in Figure 3.

Figure 3. Code implementation of magnetization expectation operators.



```
m_mx = 0
m_my = 0
m_mz = 0

for i in range(N):
  m_mz = m_mz + sz_list[i]
  m_my = m_my + sy_list[i]
  m_mx = m_mx + sx_list[i]
```