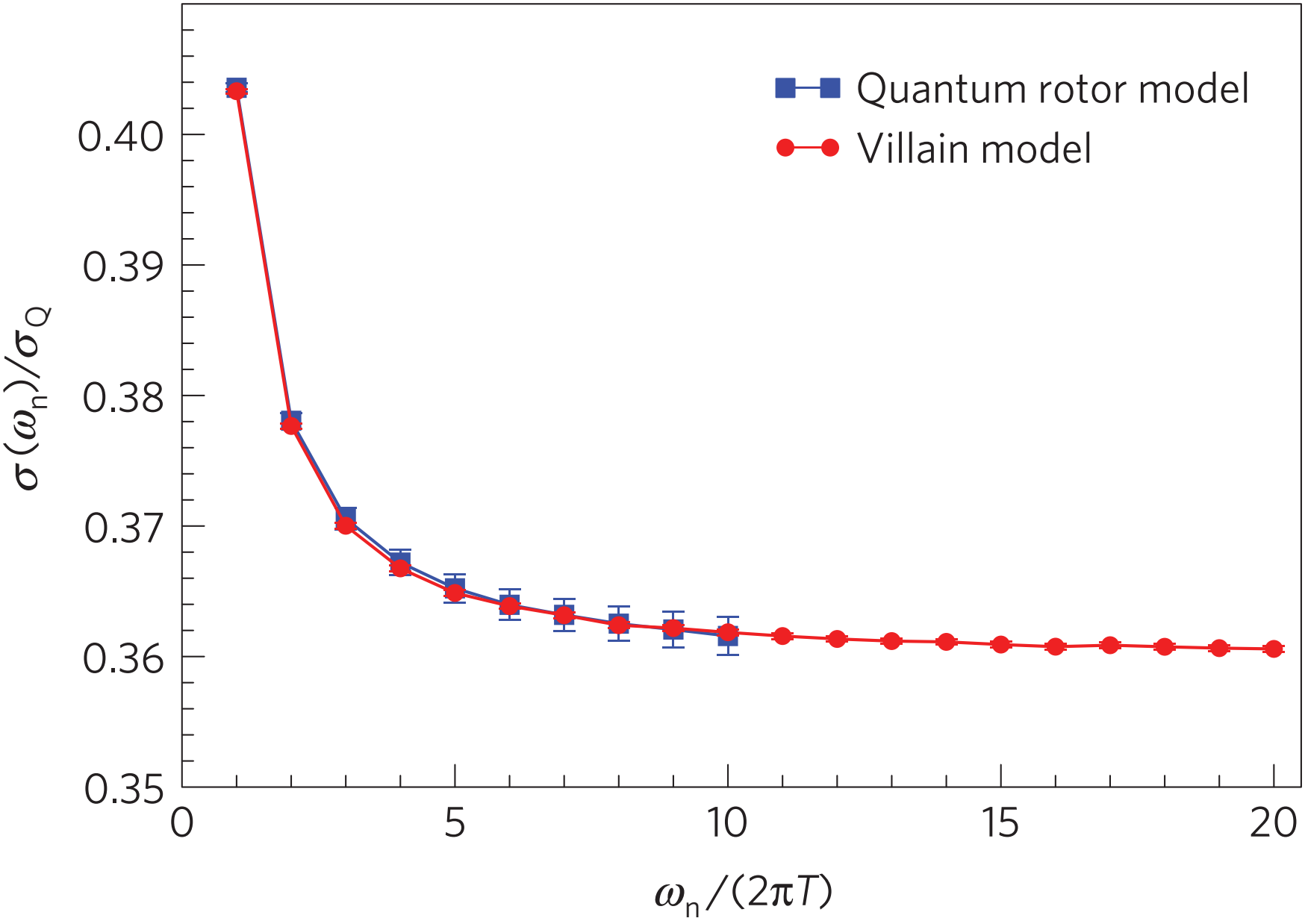
Quantum rotor model
Villain model
0.40
0.39
0.38
0.37
0.36
0.35
0
5
10
15
20
$\sigma(\omega_n)/\sigma_Q$
$\omega_n/(2\pi T)$