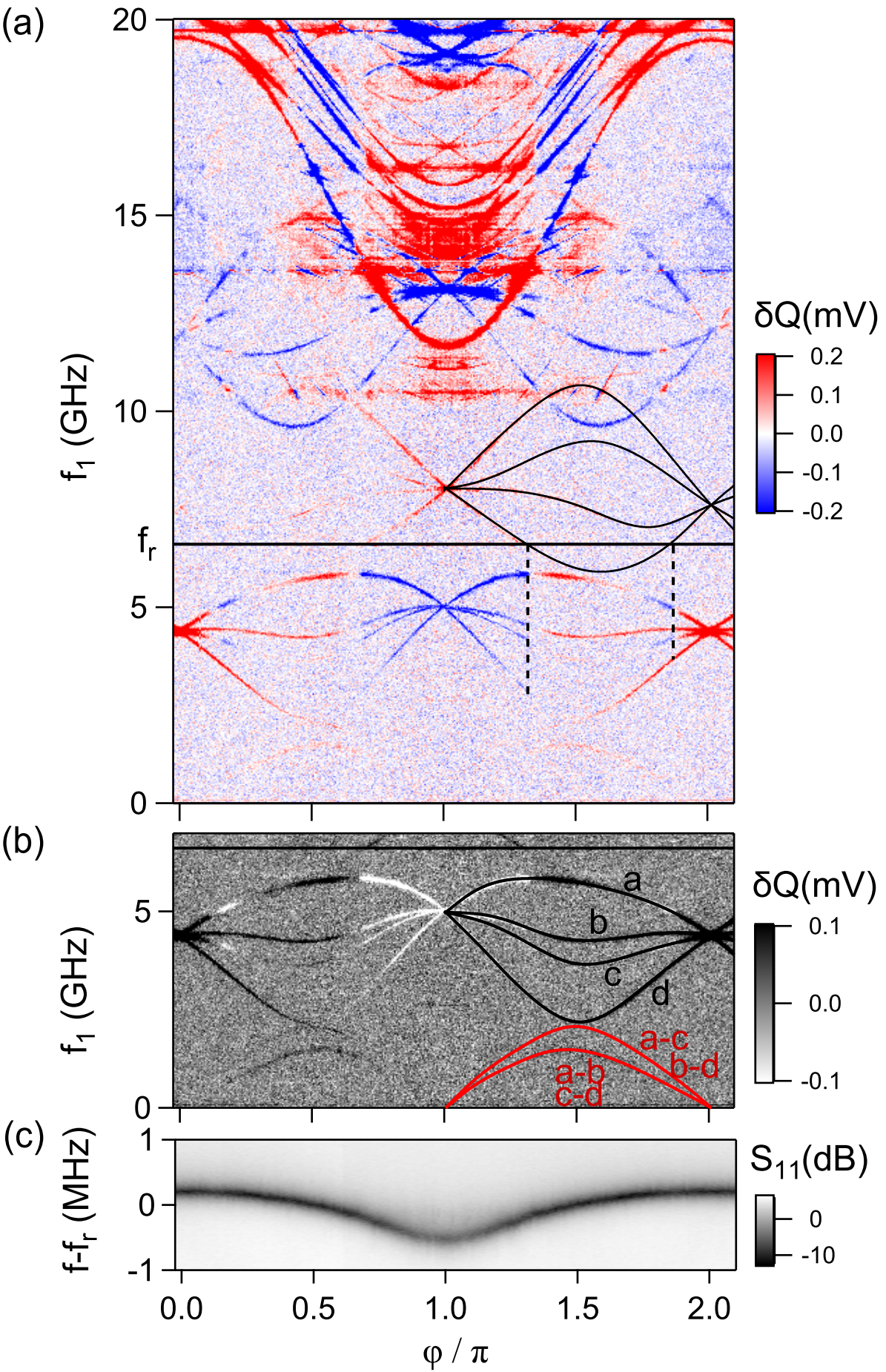
(a)
20
15
10
5
0
$f_1$ (GHz)
$f_r$
δQ(mV)
0.2
0.1
0.0
-0.1
-0.2
(b)
5
0
$f_1$ (GHz)
a
b
c
d
a-c
b-d
a-b
c-d
δQ(mV)
0.1
0.0
-0.1
(c)
1
0
-1
$f-f_r$ (MHz)
$S_{11}$(dB)
0
-10
0.0
0.5
1.0
1.5
2.0
φ / π