

CLAIMS

1. A method comprising:

receiving, by a mixing device, signals and a time-varying magnetic flux via input ports, wherein the mixing device may be a nondegenerate mixing device; and

using, by the mixing device, the signals and the time-varying magnetic flux to generate an output signal on an output port, the output signal having a waveform profile set by the time-varying magnetic flux.
2. The method of claim 1, wherein the signals comprise a first signal and a second signal at different microwave frequencies.
3. The method of any one of the preceding claims, wherein the time-varying magnetic flux is a time-varying signal having a magnitude that is modulated as a function of time.
4. The method of any one of the preceding claims, wherein the signals are continuous wave signals having an amplitude, a frequency, and a phase fixed versus time.
5. The method of any one of the preceding claims, wherein the mixing device comprises a Josephson ring modulator.
6. The method of any one of the preceding claims, wherein the waveform profile of the output signal is generated, at least in part, based on a Josephson ring modulator of the mixing device responding to the time-varying magnetic flux.
7. A method comprising:

receiving, by a circuit, signals and a time-varying magnetic flux via input ports, the circuit comprising a first mixing device coupled to a second mixing device, wherein the first mixing device and the second mixing device may be nondegenerate mixing devices; and

using, by the circuit, the signals and the time-varying magnetic flux to generate an output signal on an output port, the output signal having a waveform profile set by the time-varying magnetic flux.

8. The method of claim 7, wherein the time-varying magnetic flux is a time-varying signal having a magnitude that is modulated as a function of time.
9. The method of any one of claims 7 to 8, wherein one of the first mixing device and the second mixing device receives the time-varying magnetic flux and another one of the first mixing device and the second mixing device receives a fixed magnetic flux.
10. The method of any one of claims 7 to 9, wherein the first mixing device is configured to use a first microwave signal and a second microwave signal of the signals to provide an intermediate microwave signal to the second mixing device.
11. The method of any one of claims 7 to 10, wherein the second mixing device is configured to receive an intermediate signal from the first mixing device, the second mixing device being configured to use the intermediate signal as input to generate the output signal.
12. A method of configuring a circuit, the method comprising:
- coupling a mixing device to a magnetic source, wherein the mixing device may be a nondegenerate mixing device, the mixing device being configured to receive a time-varying magnetic flux from the magnetic source via an input port; and
- configuring the mixing device to generate an output signal on an output port, the output signal having a waveform profile set by the time-varying magnetic flux.
13. The method of claim 12, wherein the time-varying magnetic flux is a time-varying signal having a magnitude that is modulated as a function of time.
14. The method of any one of claims 12 to 13, wherein the waveform profile of the output signal is generated, at least in part, based on a Josephson ring modulator of the mixing device being configured to respond to the time-varying magnetic flux.
15. The method of any one of claims 12 to 14, wherein the mixing device comprises a Josephson ring modulator coupled to resonators.
16. The method of any one of claims 12 to 15, wherein the mixing device is configured to convert a continuous input microwave signal to a pulsed output microwave signal having a selected waveform profile.

17. A method of configuring a circuit, the method comprising:

coupling a first mixing device and a second mixing device in the circuit, wherein the first mixing device and the second mixing device may be nondegenerate mixing devices, the first mixing device being coupled to a first magnetic source to receive a fixed magnetic flux via an input port, the second mixing device being coupled to a second magnetic source to receive a time-varying magnetic flux via another input port; and

configuring the circuit to generate an output signal on an output port, the output signal having a waveform profile set by the time-varying magnetic flux.

18. The method of claim 17, wherein the time-varying magnetic flux is a time-varying signal having a magnitude that is modulated as a function of time.

19. The method of any one of claims 17 to 18, wherein the fixed magnetic flux comprises a magnitude that remains constant over time.

20. The method of any one of claims 17 to 19, wherein the first mixing device is configured to use a first signal and a second signal to provide an intermediate signal to the second mixing device.

21. The method of any one of claims 17 to 20, wherein the second mixing device is configured to receive an intermediate signal from the first mixing device, the second mixing device being configured to use the intermediate signal as input to generate the output signal.

22. A system comprising:

a first magnetic source coupled to a first part of a circuit and configured to provide a fixed magnetic flux to the first part via an input port; and

a second magnetic source coupled to a second part of the circuit and configured to provide a time-varying magnetic flux to the second part via another input port, wherein the circuit is configured to generate an output signal on an output port, the output signal having a waveform profile set by the time-varying magnetic flux.

23. The system of claim 22, wherein the first part comprises a first mixing device and the second part comprises a second mixing device, wherein the first mixing device and the second mixing may be nondegenerate mixing devices.

24. The system of any one of claims 22 to 23, wherein the first part comprises a Josephson ring modulator configured to interact with the fixed magnetic flux and the second part comprises another Josephson ring modulator configured to interact with the time-varying magnetic flux.

25. The system of any one of claims 22 to 24, wherein:

the first part is configured to output an intermediate signal to the second part; and

the second part is configured to use the intermediate signal as input to generate the output signal.