

WHAT IS CLAIMED IS:

1. ~~An apparatus~~ A ring resonator device, comprising:
an optical ring having a width; and
an optical bus evanescently coupled to the optical ring, the optical bus comprising:
a first portion having a width smaller than the width of the optical ring;
a second portion having a width smaller than the width of the optical ring; and
a middle portion between the first portion and the second portion having a width ~~matching~~ equal to the width of the optical ring.
2. The ~~apparatus~~ ring resonator device as recited in claim 1 wherein the first portion of the optical bus and the second portion of the optical bus comprise a single mode optical fiber.
3. The ~~apparatus~~ ring resonator device as recited in claim 1 wherein the middle portion of the optical bus can support multiple modes.
4. The ~~apparatus~~ ring resonator device as recited in claim 3 wherein transition areas between the first portion and middle portion and the middle portion and second portion of the optical bus are tapers.
5. The ~~apparatus~~ ring resonator device as recited in claim 4 wherein the taper comprise adiabatic tapers.
6. The ~~apparatus~~ ring resonator device as recited in claim 5 wherein the adiabatic tapers prevent multiple modes in the middle portion of the optical bus.
7. The ~~apparatus~~ ring resonator device as recited in claim 5 wherein a Q-factor for the optical ring is greater than 1500.
8. The ~~apparatus~~ ring resonator device as recited in claim 5 wherein a Q-factor is between 1500 and 11,000.

9. A method for improving Q-factor of a ring resonator device, comprising:
providing an optical ring having a width; and
evanescently coupling and optical bus to the optical ring;
launching a single mode light signal into a first portion of the optical bus having a width smaller than the width of the optical ring;
providing a first tapered portion of the optical bus after the first portion to expand the width of the optical bus near the optical ring; and
providing a second tapered portion of the optical bus to decrease the width of the optical bus, so that a second portion after the second tapered portion has a width smaller than the width of the optical ring,
wherein the optical bus between the first tapered portion and the second tapered portion has a width equal to the width of the optical ring.

10. The method as recited in claim 9 wherein the optical bus before the first ~~tapertapered~~ portion and after the second ~~tapertapered~~ portion comprises a single mode optical fiber.

11. The method as recited in claim 9 wherein the optical bus between the first ~~tapertapered~~ portion and the second ~~tapertapered~~ portion can support multiple modes.

12. The method as recited in claim 11 wherein the first ~~tapertapered~~ portion and the second ~~tapertapered~~ portion comprise adiabatic tapers.

13. The method as recited in claim 12 wherein the adiabatic tapers prevent multiple modes between the first ~~tapertapered~~ portion and the second ~~tapertapered~~ portion of the optical bus.

14. The method as recited in claim 12 wherein a Q-factor for the optical ring is greater than 1500.

15. The method as recited in claim 12 wherein a Q-factor is between 1500 and 11,000.

~~16. A ring resonator, comprising:~~

~~an optical ring having a width; and~~

~~an optical bus evanescently coupled to the optical ring, the optical bus comprising:~~

~~a first portion having a width less than the width of the optical ring, the first portion comprising a single mode optical fiber;~~

~~a second portion having a width less than the width of the optical ring, the second portion comprising a single mode optical fiber; and~~

~~a middle portion between the first portion and the second portion having a width matching the width of the optical ring.~~

~~17. The ring resonator as recited in claim 16 comprising adiabatic tapers between the first portion and middle portion and between the middle portion and the second portion.~~

~~18. The ring resonator as recited in claim 16 wherein the optical bus middle portion can support multiple mod~~
~~19. The ring resonator as recited in claim 18 wherein a Q-factor for the optical ring is greater than 1500.~~

~~20. The ring resonator as recited in claim 18 wherein a Q factor is between 1500 and 11,000.~~