CLAIMS

1. An optical power limiter comprising:

an optical input port configured for coupling to an input fiber or to an input waveguide;

an optical output port configured for coupling to an output fiber or to an output waveguide;

an effective medium disposed between the input port and the output port; and

a diaphragm disposed between the effective medium and the output port;

wherein the optical input port comprises a first collimator for forming a collimated light beam from an input light signal from the input fiber or the input waveguide;

wherein the effective medium has a thermo-optic coefficient such that the collimated light beam entering the effective medium from the direction of the input port experiences a refractive index gradient in a direction perpendicular to a propagation direction in the effective medium as a result of absorption, wherein the effective medium has a negative thermo-optic coefficient for diverging the collimated light beam as a result of the refractive index gradient into a diverged light beam;

wherein the diaphragm is disposed in a path of the diverged light beam for limiting how much of the diverged light beam reaches the output port to thereby limit output power to a chosen maximum value; and

wherein the optical output port comprises a second collimator for focusing the diverged light beam after the diaphragm into the output fiber or the output waveguide.

2. The power limiter of claim 1, wherein the diaphragm is tunable for adjusting a limit of how much of the light beam reaches the output port.

3. A method of fabricating an optical power limiter comprising the steps of:

providing an optical input port configured for coupling to an input fiber or to an input waveguide;

providing an optical output port configured for coupling to an output fiber or to an output waveguide;

disposing an effective medium between the input port and the output port; and

disposing a diaphragm between the effective medium and the output port;

wherein the optical input port comprises a first collimator for forming a collimated light beam from an input light signal from the input fiber or the input waveguide;

wherein the effective medium has a thermo-optic coefficient such that the collimated light beam entering the effective medium from the direction of the input port experiences a refractive

index gradient in a direction perpendicular to a propagation direction in the effective medium as a result of absorption, wherein the effective medium has a negative thermo-optic coefficient for diverging the collimated light beam as a result of the refractive index gradient into a diverged light beam;

wherein the diaphragm is disposed in a path of the diverged light beam for limiting how much of the diverged light beam reaches the output port to thereby limit output power to a chosen maximum value; and

wherein the optical output port comprises a second collimator for focusing the diverged light beam after the diaphragm into the output fiber or the output waveguide.

4. The method of claim 3, wherein the diaphragm is tunable for adjusting a limit of how much of the light beam reaches the output port.

5. A method of limiting optical power comprising the steps of:

directing a light beam from an input fiber or an input waveguide into an effective medium via an input port;

subjecting the light beam to a refractive index gradient in the effective medium in a direction perpendicular to a propagation direction in the effective medium as a result of absorption; and

limiting how much of the light beam reaches an output port and is coupled to an output fiber or an output waveguide along the propagation direction;

wherein the optical input port comprises a first collimator for forming a collimated light beam from the light beam from the input fiber or the input waveguide;

wherein the effective medium has a negative thermo-optic coefficient for diverging the collimated light beam as a result of the refractive index gradient into a diverged light beam;

wherein a diaphragm is disposed in a path of the diverged light beam for limiting how much of the diverged light beam reaches the output port to thereby limit output power to a chosen maximum value; and

wherein the optical output port comprises a second collimator for focusing the diverged light beam after the diaphragm into the output fiber or the output waveguide.

6. The method of claim 5, comprising adjusting a limit of how much of the light beam reaches the output port.

7. A method of upper bounding information leakage in quantum cryptography using the optical power limiter of claims 1 or 2 or a power limiter comprising:

an optical input port;

an optical output port;

an effective medium disposed between the input port and the output port; and

a diaphragm disposed between the effective medium and the output port;

wherein the effective medium has a thermo-optic coefficient such that a light beam entering the effective medium from the direction of the input port experiences a refractive index gradient in a direction perpendicular to a propagation direction in the effective medium as a result of absorption; and

wherein the diaphragm is disposed in a path of the light beam for limiting how much of the light beam reaches the output port,

and/or using the method of claims 5 or 6 or a method of limiting optical power comprising the steps of:

directing a light beam into an effective medium disposed via an input port;

subjecting the light beam to a refractive index gradient in the effective medium in a direction perpendicular to a propagation direction in the effective medium as a result of absorption; and

limiting how much of the light beam reaches an output port along the propagation direction.

8. A quantum cryptography system comprising the optical power limiter of claims 1 or 2 or a power limiter comprising:

an optical input port;

an optical output port;

an effective medium disposed between the input port and the output port; and

a diaphragm disposed between the effective medium and the output port;

wherein the effective medium has a thermo-optic coefficient such that a light beam entering the effective medium from the direction of the input port experiences a refractive index gradient in a direction perpendicular to a propagation direction in the effective medium as a result of absorption; and

wherein the diaphragm is disposed in a path of the light beam for limiting how much of the light beam reaches the output port,

configured for upper bounding information leakage.