CLAIMS

1. A method of key distribution comprising the steps of:

providing a free space optics, FSO, link between a transmitter and a receiver;

detecting whether an eavesdropper is present along the FSO link;

transmitting individual photons or weak coherent pulses, as an approximation of individual photons, each encoding a basic unit of the key according to a binary or higher number base system from the transmitter to the receiver; and

comparing timing information associated with the transmission and reception of the individual photons for determining the key when it is detected that no eavesdropper is present along the FSO link.

2. The method of claim 1, wherein transmitting the individual photons comprises generating a mixture of photon pairs encoding different basic units, respectively, using Spontaneous Parametric Downconversion, SPDC.

3. The method of claim 2, wherein generating the mixture of photon pairs comprises using a single pump laser coupled to one or more nonlinear optical crystals, and the method further comprises:

detecting one of the photons from each pair at the transmitter for generating the timing information associated with the transmission of the individual photons; and

detecting the other photon from each pair at the receiver for decoding the basic unit and generating the timing information associated with the reception of the individual photons;

or wherein generating the mixture of photon pairs comprises using two pulsed pump lasers coupled to respective nonlinear optical crystals, and the method further comprises:

monitoring which of the two pulsed pump lasers was used at what time incidence for generating the timing information associated with the transmission of the individual photon;

transmitting only one of the photons from each pair; and

detecting the transmitted photon from each pair at the receiver for decoding the basic unit and generating the timing information associated with the reception of the individual photon.

4. The method of claim 1, comprising generating single photons using one or more solid state single photon emitters, and/or wherein each photon encodes the basic unit of the key as a wavelength state.

5. The method of claim 1, comprising using a decoy state system to mitigate an eavesdropper harvesting the quantum signals that have been scattered by the atmosphere

when the method comprises transmitting the weak coherent pulses, as an approximation of individual photons.

6. The method of claim 1, wherein each photon encodes the basic unit of the key as a polarization state, and optionally further comprising rotating the individual photons into circular polarization bases for transmission and out of the circular polarization bases for detection.

7. A key distribution system comprising:

a transmitter;

a receiver; and

a free space optics, FSO, link between the transmitter and the receiver;

wherein the transmitter is configured to transmit individual photons or weak coherent pulses, as an approximation of individual photons, each encoding a basic unit of the key according to a binary or higher number base system from the transmitter to the receiver; and

wherein the system further comprises a key determination unit configured to compare timing information associated with the transmission and reception of the individual photons for determining the key when it is detected that no eavesdropper is present along the FSO link.

8. The system of claim 7, wherein the transmitter is configured to generate a mixture of photon pairs encoding different basic units, respectively, using Spontaneous Parametric Downconversion, SPDC.

9. The system of claim 8, wherein the transmitter comprises a single pump laser coupled to one or more nonlinear optical crystals for generating the mixture of photon pairs, and the key determination unit is configured to:

detect one of the photons from each pair at the transmitter for generating the timing information associated with the transmission of the individual photons; and

detect the other photon from each pair at the receiver for decoding the basic unit and generating the timing information associated with the reception of the individual photons;

or wherein the transmitter comprises two pulsed pump lasers coupled to respective nonlinear optical crystals for generating the mixture of photon pairs, the transmitter further being configured to transmit only one of the photons from each pair, and the key determination unit is configured to:

monitor which of the two pulsed pump lasers was used at what time incidence for generating the timing information associated with the transmission of the individual photon; and

detect the transmitted photon from each pair at the receiver for decoding the basic unit and generating the timing information associated with the reception of the individual photon.

10. The system of claim 7, wherein the transmitter comprises one or more solid state single photon emitters.

11. The system of claim 7, comprising a decoy state system to mitigate an eavesdropper harvesting the quantum signals that have been scattered by the atmosphere when the transmitter is configured to transmit the weak coherent pulses, as an approximation of individual photons.

12. The system of claim 7, wherein each photon encodes the basic unit of the key as a polarization state, and optionally further comprising a rotation unit for rotating the individual photons into circular polarization bases for transmission and out of the circular polarization bases for detection.