

CLAIMS

1. A quantum key distribution network comprising:
 - a source configured to generate photon pairs based on spontaneous parametric downconversion;
 - 5 a splitter configured for splitting photons generated by the source into different optical links;
 - a plurality of nodes configured to receive the photons via respective ones of the optical links; and
 - a communication link between the nodes for exchanging timing information about the reception of the photons between the nodes to determine photons of one pair being received by two of the nodes.
- 10 2. The network of claim 1, wherein the source is configured to generate the photon pairs at random times.
3. The network of claim 2, wherein the source comprises a pump laser for passing a laser beam through a nonlinear medium with $\chi^{(2)}$ nonlinearity.
- 15 4. The network of claim 3, wherein the pump laser is configured for operating continuously, in CW-mode.
5. The network of any one of claims 1 to 4, wherein the network is configured to provide the timing information about the reception of the photons as a time synchronization service.
- 20 6. The network of any one of claims 1 to 5, wherein the optical links between the splitter and the nodes are direct.
7. The network of claim 6, wherein the optical links are built entirely out of passive components.
8. The network of any one of claims 1 to 7, wherein an optical source link between the source and the splitter is direct.
- 25 9. The network of claim 8, wherein the optical source link is built entirely out of passive components.
10. A method of quantum key distribution in a network, comprising the steps of:
 - generating photon pairs based on spontaneous parametric downconversion using a
 - 30 source;
 - splitting photons generated by the source into different optical links using a splitter;

providing a plurality of nodes configured to receive the photons via respective ones of the optical links; and

providing a communication link between the nodes for exchanging timing information about the reception of the photons between the nodes to determine photons of one pair being received by two of the nodes.

11. The method of claim 10, comprising generating the photon pairs at random times using the source.

12. The method of claim 11, comprising passing a pump laser beam through a nonlinear medium with $\chi^{(2)}$ nonlinearity.

10 13. The method of claim 12, wherein the pump laser beam is operated continuously, in CW-mode.

14. The method of any one of claims 10 to 13, comprising provide the timing information about the reception of the photons as a time synchronization service.

15 15. The method of any one of claims 10 to 14, wherein the optical links between the splitter and the nodes are direct.

16. The method of claim 15, wherein the optical links are built entirely out of passive components.

17. The method of any one of claims 10 to 16, wherein an optical source link between the source and the splitter is direct.

20 18. The method of claim 17, wherein the optical source link is built entirely out of passive components.