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(54) **REAL-TIME PHOTON NUMBER DETERMINATION**

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(57) **ABSTRACT**

Systems, methods and computer program products for real-time routing of optical signals. A signal trace is received by a signal processor from a photon-number resolving detector. The signal trace is produced by the photon-number resolving detector in response to an optical pulse from a light source (e.g. a pulsed laser). The signal processor determines the photon number of the optical pulse by applying a function to the signal trace and one or more reference traces. A feedback signal is then defined based on the photon number of the optical pulse. The feedback signal is used to control the operation of a switch positioned in the path of a related optical signal. The switch operates to define the forward routing path of the related optical signal.