

Annex A

Brief description of the technology

This invention regards a device for quantum random number generation (QRNG) capable of generating and detecting a flow of photons with single photon level resolution, and is characterised by the fact that the generator and detector are monolithically integrated on the same semiconductor substrate. Furthermore, two bit extraction formats of a physical size ensuring the system is robust in relation to external intervention are proposed.

One possible example of a physical process related to QRNG is detection of the photons emitted by a light source using an appropriate detector with single photon level resolution (e.g. SPAD). With the usual system the light source and detector are separate devices that need to be suitably linked and screened in order to avoid the influence of uncontrolled external environmental effects. This invention proposes monolithic integration of the source and sensor on the same semiconductor substrate. It is also proposed that the source use the same manufacturing technology adopted for the detector (SPAD), without the need to introduce further technological steps. The specific application of QRNG requires the detection of single photon events: the efficiency of the photon generation process in the source is not therefore of a binding nature or a priority in the case in question. The solution proposed is also suitable for implementation in a pixel, and thus organised within a matrix of elements in order to extend the bit generation flow thanks to parallelization.

Description of the level of technological development

The technology has been demonstrated with a multichip approach constructed using CMOS technology, where the photon detector and generator were constructed on different wafers, then glued together. The protocols for random number extraction were tested on data generated by the glued system. The quality of the random numbers was checked in relation to internationally accepted tests. Thus the phase still undergoing experimentation and development is monolithic implementation of QRNG, namely the planning-construction-testing of an integrated source/detector system.

Annex B

CONFIDENTIALITY AGREEMENT

BETWEEN

_____, _____ (ENTER COMPANY NAME), VIA _____, _____, VAT No. _____ (abbreviated to _____), in the person of the legal representative _____, hereafter also referred to as the *Receiving Party*

AND

TRENTINO SVILUPPO S.P.A (abbreviated to TS), an Italian company with its premises in Rovereto (Trento) in Via Fortunato Zeni 8, taxpayer's code and VAT no. 00123240228, for the purposes of this document represented by _____, who acts on behalf of the Provincia Autonoma di Trento, _____ hereafter also referred to as the *Disclosing Party*

jointly referred to as "the Parties"

whereas:

- a) _____ intends to manifest its interest in the public notice announced by TS for the assignment or licensing of the Technology, as it is described hereafter, for the purposes of its promotion, the term "promotion" being taken to mean all the development, industrialisation, production and commercialisation activities necessary in order to make the product usable by the market;
- b) The Technology is intended to mean all patent rights or applications for patents, certification obtained and technical documentation, including material regarding the trials and tests carried out in relation to the invention "*SPAD based architectures for QRNG*" developed in the context of the "Siquro" project;
- c) It is the intention of the Receiving Party to obtain access to the documentation regarding the Technology in order to acquire further information in relation to the manifestation of interest that it may choose to present;
- d) This agreement does not oblige the Parties to stipulate a definitive contract, but rather has the sole scope of regulating the confidentiality obligations resulting from access to the *Disclosing Party's* confidential documents and information and in general confidentiality commitments regarding any information that the Parties may become aware of during the study;

On the basis of the foregoing recitals, the Parties stated and domiciled as above

agree and stipulate the following:

Article 1 - Validity of the recitals.

The recitals constitute an integral and substantial part of this agreement.

Article 2 - Object of the agreement.

This agreement regulates the confidentiality obligations to which the Parties are subject as regards any information, data and knowledge described as “confidential” according to the following articles that the Parties may become aware of when carrying out the activities described in the recitals. The *Receiving Party* shall not take on any obligations other than those provided for by this agreement.

Article 3 - Confidential Information.

For the purposes of this agreement, *Confidential Information* is understood to be information, data, knowledge, know-how, studies, research methods, procedures, formulas, test results, ideas, plans, drawings, technical reports and any other information regarding the Technology described in the recitals.

Confidential Information may be transmitted between the Parties in written or tangible form, or in oral or intangible form (including digital formats). Information transmitted in written or tangible form shall be indicated as “Confidential Information” and the *Receiving Party* must sign a receipt. Information transmitted in oral or intangible form must be followed within thirty days by a written communication from TS to the *Receiving Party* specifically defining the data provided as “Confidential Information”.

Article 4 - Exceptions.

In no case shall *Confidential Information* be considered to include information that:

- a) is public knowledge on the date that this agreement is signed, or that becomes so following the aforementioned acquiring of information through actions or behaviour not forbidden to the *Receiving Party*;
- b) is known and/or can be demonstrated to be known to the *Receiving Party* at the time it is transmitted;
- c) is transmitted to the *Receiving Party* and specifically described as non-confidential;
- d) has been developed independently by the *Receiving Party*, without using the *Confidential Information*, so long as these circumstances can be proved through documentation;
- e) is revealed to the *Receiving Party* by a party other than the *Disclosing Party*, which is not bound by a secrecy obligation related to this Agreement, and that in any case becomes known to the *Receiving Party* as a result of circumstances not attributable to the same;
- f) is disseminated following previous authorisation in writing by the Party that has transmitted it.

Article 5 - Protection obligations.

The *Receiving Party* undertakes in all cases to keep the *Confidential Information* secret and not to communicate it to third parties, nor to disseminate and/or use it for purposes other than participation in the study.

For this purpose the *Receiving Party* will handle the *Confidential Information* with the same precautions that it would adopt if it were the owner or holder, adopting all technical and legal security measures reasonably appropriate for maintaining confidentiality. Furthermore, it shall not allow access to *Confidential Information* to persons other than those strictly necessary in order to evaluate the information and to those who are not committed in writing to secrecy and this agreement, without prejudice to the liability of the *Receiving Party* in relation to any infringements by persons to whom it has communicated *Confidential Information*.

The *Receiving Party* shall inform TS of the names of all those who have come into contact with the *Confidential Information*.

Article 6 - Disclosure obligation.

The *Receiving Party* shall immediately advise the *Disclosing Party* of any infringements of the *Confidential Information* that the *Receiving Party* becomes aware of, and it must collaborate with TS in safeguarding the rights of the latter.

In the event that it is necessary to disclose the *Confidential Information* according to the law or regulations, or to comply with a provision of the relevant authorities, the Parties are required to consult with each other in order to reach agreement as regards the timing and content of any such disclosure, unless otherwise required by the law, regulations or public authority.

Article 7 - Use of the Confidential Information.

The *Receiving Party* may only use the *Confidential Information* for the purposes of participating in the public notice announced by TS and only for the time necessary for this purpose.

The *Receiving Party* may not analyse or use the *Confidential Information* for any purpose not relevant to this scope.

Article 8 - Ownership of material (if relevant).

All material shown to, handed over and transmitted to the *Receiving Party* and containing any *Confidential Information* shall remain the property of TS. As in the case of the *Confidential Information* itself, it must be returned by the *Receiving Party* to TS without delay and destroyed or cancelled from the memory of computers or any other form of memory support, both local and remote, following a straightforward request of the *Disclosing Party*, or at the latest, when relations between TS and the *Receiving Party* are interrupted.

Article 9 - Intellectual and industrial property rights.

All intellectual and industrial property rights in relation to the *Confidential Information* and any other information that TS may communicate or make available to the *Receiving Party* are and shall remain the property of the *Disclosing Party*. Neither the stipulation or implementation of this agreement, nor the communication or making available of *Confidential Information* shall be considered to represent the ceding or licensing of intellectual or industrial property rights to the *Receiving Party*.

TS reserves the right to file patent applications and to use secret information incorporating one or more items of *Confidential Information*, throughout the world.

The *Receiving Party* undertakes not to file patent applications and not to use secret information incorporating one or more items of *Confidential Information*, throughout the world.

Should the *Receiving Party* obtain any know-how from analysis of the *Confidential Information*, the ownership of this shall be defined specifically by the Parties in the consultancy contract or in a separate agreement.

Article 10 - Duration.

This confidentiality agreement shall have a duration of five (5) years starting from the date it is signed, unless its validity is extended following a written agreement between the Parties.

Article 11 - Form.

Any amendments to this agreement must be made in writing and signed by both the Parties.

Article 12 - Applicable law and jurisdiction.

This agreement is subject to Italian law and the exclusive jurisdiction of the Italian legal authorities.

Article 13 - Competent court.

The Court of Trento shall have exclusive jurisdiction in relation to any disputes that may arise between the Parties in relation to this agreement.

_____date, _____

Trentino Sviluppo S.p.A
