

**PROgraMmable integrated photonic nEuromorphic and quanTum networks for High-speed imaging,**

**communications and sEcUrity applicationS**

**D6.2 Repository with the associated codes for neuromorphic and quantum computing**

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# Executive summary

The concept of this deliverable targets the generation of an open repository; including all the in-house numerical models developed so as to emulate PROMETHEUS’ hardware modules (mesh, lasers atc.). In addition, it includes the source codes developed through PROMETHEUS life span that allow the realization of specific applications in the neuromorphic and quantum area. Therefore, this accompanying document only summarizes the scope of the different source codes. In the Zenodo repository all the source codes are included in separate directories, whereas in each directory a separate readme.txt file contains in depth information about each source code such as: scope, installation guidelines, library dependencies, execution instructions, dataset needed for experimentations etc.

The following source codes are included that do not evoke any confidentiality restrictions:

* Two-section quantum well laser simulation aiming to investigate excitability under optical /electrical injection (matlab)
* Extreme Learning Machine based on time-delayed scheme using excitable two-section quantum well lasers: targeting image classification (matlab)
* Recurrent optical spectrum slicing scheme targeting self-coherent (QAM, QPSK) and PAM equalization subject to transmission impairments (matlab)
* Mesh based on Mach-Zehnder Delayed Interferometer (MZDI) for unitary matrix generation and SVD. Including thermal crosstalk, targeting Bayesian training and time-series prediction. (python)
* Optical Spectrum Slicing and hyperparameter optimization targeting image classification (medical cytometry etc) (python)
* Event-trace pre-processing: synthetic frame generation, object tracking, etc (PROPHESEE and INIVATION versions) (python)
* Optical Spectrum Slicing module allowing spectral shape optimization for image classification (MNIST, Fashion MNIST)
* Quantum random number generation and evaluation module, using MZDI meshes (python).