Neural information processing needs can best be met by combining light for communication with electronics for computation. Scaling requires efficiency, and the limit will be achieved when single photons are used. This physical reasoning leads to new neuromorphic hardware, and here we present a series of papers exploring relevant neural circuits and networks in detail. Because of physical reasoning, we have conceived of a technology that will “bridge the gap between engineering and physics, between industry and academia, and between current and future technologies.” Therefore, we think this work is an ideal fit for publication in Journal of Applied Physics.

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