# Spintronic Functional Nanostructures for Artificial Neural Network

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Energy consumption reduction becomes a crucial parameter constraining the advance of supercomputers. The non-von Neumann architectures, first of all – the Artificial Neural Networks (ANN) based on superconducting spintronic elements, seems to be the most promising solution. Superconducting ANN needs elaboration of two main elements – nonlinear one (neuron) [1] and linear connecting element (synapse) [2]. Results of our theoretical and experimental study of the proximity effect in a stack-like superconductor/ferromagnet (S/F) superlattice with Co-ferromagnetic layers of different thicknesses and coercive fields, and Nb-superconducting layers of constant thickness equal to coherence length of niobium are presented.

Superconducting spin-valves and superconducting synapse, based on layered hybrid S/F nanostructures was designed and investigated.

The layered nanostructures Nb/Co demonstrate change of the superconducting order parameter in thin s-films due to switching from the parallel to the antiparallel alignment of neighboring F-layers. We argue that such superlattices can be used as tunable kinetic inductors for ANN synapses design.

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