

Superconductive Three-Terminal Amplifier / Discriminator

Orlando Quaranta, Stefania Marchetti,
Nadia Martucciello, Sergio Pagano,
Mikkel Ejrnaes, Roberto Cristiano, Ciro Nappi

Abstract — We describe a new superconductive three-terminal device that acts as a fast pulse amplifier and discriminator. The device is based on a parallel nano-wire configuration. The nano-wires are properly biased near their critical current. When a current pulse of sufficient amplitude is injected into one of the wires, a transition to the normal state of all the wires occurs, thus generating a large output current pulse. This device could be used as a pulse amplifier for signals generated by nano-wire detectors or by RSFQ circuits. The parallel nano-wire structure can be realized with the same fabrication process used for NbN Superconducting Single Photon Detector (SSPD), so its integration into the existing technology is straightforward. Here we present numerical simulations of the device, with special attention to circuit requirement for the correct operation.

Index Terms — Fast Pulse, Parallel SSPD, Pulse Discriminator, Superconductive Amplifier, Three-terminal Device.

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O. Quaranta S. Marchetti and S. Pagano are with Dipartimento di Fisica “E.R. Caianiello”, Università di Salerno, Baronissi (SA), 84081 Italy (S. Pagano phone: +39-089-965327; fax: +39-089-965275; e-mail: serpa@sa.infn.it).

O. Quaranta and S. Pagano are with CNR-INFN “Coherentia”, Naples, 80126 Italy.

N. Martucciello is with CNR-INFN “Supermat”, Baronissi (SA), 84081 Italy.

M. Ejrnaes R. Cristiano and C. Nappi are with CNR Istituto di Cibernetica “E. Caianiello”, Pozzuoli (NA), 80078 Italy.