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**SM-RAM – Superconducting Magnetic Random Access Memory based on the absolute spin valve effect.****Elia Strambini**

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**M**agnetism and superconductivity, two antagonist orders in bulk materials, can coexist at the nanoscale and generate exotic states and/or improve device functionalities and performances. Seminal works from the 80's have demonstrated this strong hybridization in thin bilayers of ferromagnetic insulators (FI) and conventional superconductors (S) such as EuS and Al. A renewed interest in studying FI/S structures came with the development of superconducting spintronics. Ferromagnetic insulators (FIs) attached to a superconductor are known to induce triplet superconducting pairing and an exchange energy splitting in the Bardeen-Cooper-Schrieffer (BCS) density of states proportional to the FI magnetization, and penetrating into the superconductor to a depth comparable with the superconducting coherence length. We show a technological application of this hybrid material to implement an absolute spin-valve with a tunnel junction made with a two EuS/Al layers. The tunneling spectroscopy of our devices reveals a clear exchange splitting of the BCS peaks strongly correlated with the relative magnetization of the two EuS layers. The high contrast in the tunneling magnetoresistance (TMR) measured at low temperatures (<1 K) demonstrate the promising capabilities of this valve to implement a superconducting magnetic RAM. Furthermore, the hard gap and clear intrinsic spin-splitting observed in our tunneling spectroscopy measurements indicate that EuS/Al bilayers are an excellent platform for the development of large variety of quantum technologies requiring the coexistence of superconducting correlations and built-in spin-splitting exchange fields, as for example in the field of Majorana-based quantum computation or for ultrasensitive thermoelectric radiation detectors.

**Biography**

Elia Strambini has completed his PhD cum Laude at the age of 31 years from Scuola Normale Superiore and postdoctoral studies from Twente University, in the Nanoelectronics group. He has been awarded by a Marie Curie Fellowship and he is now a researcher in the group of Superconductivity of CNR-NANO at the NEST laboratories in Pisa. He has published more than 30 papers in reputed journals and has more than 10 invited presentations to international conferences and Universities.

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