

HUMAN CAPITAL AND MOBILITY

MAGNETIC AND TRANSPORT PROPERTIES OF NOVEL MESOSCOPIC MAGNETIC THIN FILMS AND MULTILAYERS

Principal Contractor

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Summary

This network will combine the technical expertise and unique experimental facilities of six European laboratories to study the novel and exciting properties of mesoscopic magnetic systems. Such systems, whose physical dimensions are comparable to the magnetic correlation length are expected to exhibit strong modifications of their magnetic and electrical properties. By combining state of the art nanostructuring technology with magnetic multilayering at an atomic level to produce magnetic systems with submicron lateral dimensions, the project will lead to new insights and physical understanding of the ultimate limits to the recording density of magnetic media. Furthermore, we propose innovative magnetic systems, for the first time to our knowledge, such as penrose lattice arrays of giant magnetic atoms and arrays of randomly frustrated dipolar coupled systems. This will have far-reaching consequences for the understanding of fundamental submicromagnetism, for theoretical modelling of magnetic phase transition and ultimately, for new materials and devices. This new field of study requires the marriage of two well established high technologies (magnetic multilayers and nanofabrication) in addition to a large armoury of techniques appropriate to magnetic and thin film studies. While each of the participating European laboratories has a well recognized research record in the preparation and characterization of magnetic structures, only the association through the proposed network will provide the necessary infrastructure to use the expertise and highly specialized experimental facilities at different location to address the proposed research in an appropriate way. The thrust of our proposal is:

- a) to associate the European laboratories having the necessary expertise, so as to initiate rapidly and smoothly this exciting new field of research,
- b) to establish a human reserve of expertise in this area of scientific research by training a core of young scientists in the technologies, analytical tasks and scientific methods involved in the project.