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DOMENII DE CERCETARE:
Spintronică, Nanomagnetism, materiale și tehnologii cuantice și neuronale

Aceste domenii sunt situate in aria de convergenta a fizicii sistemelor de dimensionalitate redusa, micro/nanotehnologiilor. Spintronica combina magnetismul si electronica conventionala urmarind manipularea simultana a spinului si sarcinii electronului in dispozitive pe baza de heterostructuri de filme subtiri complexe. Acestea se regasesc in aplicatii de ultima generatie de tip senzori, memorii magnetice nonvolatile, nano-oscilatori, retele neuronale artificiale, tehnologii cuantice (qubits).

Prin activități de ceretare fundamentala de avangardă urmărim elaborarea și dezvoltarea fizicii aferente a unor materiale complexe inovative de dimensionalitate mezoscopica cu proprietati predefinite. Plecand de la acestea, prin tehnici micro si nanolitografice, pot fi elaborate micro si nano-demonstratori ai unor componente electronice de generatie avansata. Cercetarile derulate vor implica, la nivel experimental tehnici specifice de elaborare si caracterizare structurală, morfologică, magnetică si electrică pentru sisteme mezoscopice de dimensionalitate variabilă 3D, 2D, 1D (filme subtiri, suprafete, interfete, nanostructuri). Acestea vor fi însoțite de activitati de modelare teoretică a structurii electronice, a proprietatilor magnetice si de transport respectiv modelare micromagnetică și atomistică a proprietăților magnetice dinamice.

RESEARCH FIELD: Spintronics, Nanomagnetism, Quantum and Neuromorphic Materials and Technologies

These domains belong to the convergence area of low dimensional system Physics, micro and nanotechnologies. The Spintronics combines the Magnetism and the conventional Electronics and is based on the simultaneous manipulation of the electron's spin and charge in complex thin-film heterostructures. It has major applications in frontier technologies of sensors, nonvolatile magnetic memories, nano-oscillators, Artificial Neural Networks, Quantum Technologies (qubits).

Following upstream research activities, we aim to elaborate and develop the adjacent Physics of innovative complex materials at mesoscopic scale with tailored functional properties. Then, in a next step, micro and nano-demonstrators of advanced electronic components are being developed using micro and nano-lithographic techniques. The research carried out involves specific techniques for structural, morphological, magnetic, and electric characterization for 3D, 2D, 1D (thin films, surfacses, interfaces, nanostructures) mesoscopic systems. The experimental research is complemented by multiscale theoretical calculation of the electronic structure, of magnetic and transport properties of mesoscopic systems and spintronic devices, and by various micromagnetic and atomistic modelling.

FURTHER INFORMATION: **Personal web page**: https://nanospin.ro/webperso/welcome.html
http://nanospin.ro
Research center: http://phys.ubbcluj.ro/ursu.htm