Interuniversity Attraction Poles (IAP)
Phase VI

2007 – 2011

ANNEX I
TO CONTRACT P6/42

TECHNICAL SPECIFICATIONS : SECTION II

Information on the partners
to be completed by each network partner including the EU-partner(s)

Title of the project : Quantum effects in clusters and nanowires

Name of the partner : VAN HAESENDONCK Chris
Institution : Departement Natuurkunde en Sterrenkunde, Katholieke Universiteit Leuven
II. 1. PARTNER CONTACT DETAILS

PARTNER N° (consult the list in Section I of Annex I) * : P2

- Family Name : Van Haesendonck
- First Name : Christian
- Title (Prof., Dr., … ) : Prof.
- Institution : Katholieke Universiteit Leuven
- Institution’s abbreviation : K.U.Leuven
- Faculty/Department : Science / Physics and Astronomy
- Research Unit : Laboratory of Solid-State Physics and Magnetism
- Road/Street, n° : Celestijnenlaan 200D
- Post Code : B-3001
- Town/City : Leuven
- Country : Belgium
- Tel : 32-(0)16-327501
- Tel secretariat : 32-(0)16-327184
- Fax : 32-(0)16-32 7983
- E-mail : Chris.VanHaesendonck@fys.kuleuven.be

* For Belgian partners : P1 to P6
For EU-partners : EU
II. 2. STAFF MEMBERS WORKING ON THE PROJECT (paid and not paid by the IAP-budget)

<table>
<thead>
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<th>Staff</th>
<th>Number</th>
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<td>Technician</td>
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II. 3. SKILLS OF THE STAFF MEMBERS

Indicate the name, profile (professor, senior scientist, post-doctoral, PhD student, researcher without PhD, technician, secretary or other) and areas of skills (5 lines maximum) of the most important personnel currently working within the project’s framework (paid or not paid by the IAP-budget).

1. Name: Christian Van Haesendonck  
   Profile: Professor  
   Skills: nanostructures, scanning probe microscopy, magnetism

2. Name: Peter Lievens  
   Profile: Professor  
   Skills: physical properties of clusters, cluster assemblies, laser spectroscopy

3. Name: Jean-Pierre Locquet  
   Profile: Professor  
   Skills: relation between functional properties and atomic scale structure of heterostructures and nanoparticles

4. Name: Victor Moshchalkov  
   Profile: Professor  
   Skills: nanostructures, superconductivity, magnetism, high magnetic fields

5. Name: Roger Silverans  
   Profile: Professor  
   Skills: metal clusters, laser spectroscopy, laser-solid interactions

6. Name: Kristiaan Temst  
   Profile: Professor  
   Skills: low-dimensional magnetism, nanostructures

7. Name: Margriet Van Bael  
   Profile: Professor  
   Skills: low-dimensional superconductivity, scanning probe microscopy

8. Name: André Vantomme  
   Profile: Professor  
   Skills: nuclear solid state physics

9. Name: Stefaan Cottenier  
   Profile: Senior scientist  
   Skills: ab-initio hyperfine interaction calculations

10. Name: Johan Meersschaut  
    Profile: Senior scientist  
    Skills: magnetism in low-dimensional systems

11. Name: Johan Vanacken  
    Profile: Senior scientist  
    Skills: superconductivity, pulsed magnetic fields

12. Name: Alexander Volodin
13. Name: Riet Callens  
Profile: Post-doctoral researcher  
Skills: development of new synchrotron measurement schemes

14. Name: Marcel Di Vece  
Profile: Post-doctoral researcher  
Skills: cluster deposition on surfaces, extended X-ray absorption fine structure measurements

15. Name: Ewald Janssens  
Profile: Post-doctoral researcher  
Skills: metal and oxide clusters, laser spectroscopy and mass spectrometry

16. Name: Tomas Kana  
Profile: Post-doctoral researcher  
Skills: computational physics

17. Name: Aurélie Lando  
Profile: Post-doctoral researcher  
Skills: metallic clusters, self-assembly of organic layers

18. Name: Jyoti Mohanty  
Profile: Post-doctoral researcher  
Skills: low-dimensional magnetism, scanning probe microscopy

19. Name: Sven Neukermans  
Profile: Post-doctoral researcher  
Skills: bimetallic clusters, laser spectroscopy and mass spectrometry

20. Name: Manish Palchowdhury  
Profile: Post-doctoral researcher  
Skills: carbon nanotubes, nanolithography

21. Name: Sudipta Sarkar Pal  
Profile: Post-doctoral researcher  
Skills: Self-assemblies of organic layers and nanoparticles, scanning probe microscopy

22. Name: Dries Smeets  
Profile: Post-doctoral researcher  
Skills: surface deposition, thin film growth mechanisms

23. Name: Alejandro Silhanek  
Profile: Post-doctoral researcher  
Skills: nanostructured superconductors

24. Name: Shufang Song  
Profile: Post-doctoral researcher  
Skills: ion implantation

25. Name: Qing-feng Zhan  
Profile: Post-doctoral researcher
Skills: magnetic nanostructures, scanning probe microscopy

26. Name: Francisco Almeida  
Profile: PhD student  
Skills: exchange bias anisotropy

27. Name: Steven Brems  
Profile: PhD student  
Skills: mesoscopic ferromagnets, exchange bias

28. Name: Wim Decelle  
Profile: PhD student  
Skills: molecular nanomagnets in pulsed fields

29. Name: Stefan Decoster  
Profile: PhD student  
Skills: ion implantation in germanium

30. Name: Jorg De Haeck  
Profile: PhD student  
Skills: mass spectrometry of mixed clusters

31. Name: Katrien De Keyser  
Profile: PhD student  
Skills: Hall probe microscopy of superconducting and hybrid S/F nanostructures

32. Name: Jelle Demeulemeester  
Profile: PhD student  
Skills: thin film growth mechanisms

33. Name: Joachim Fritzsche  
Profile: PhD student  
Skills: superconductivity and tunneling in S/F hybrids

34. Name: Werner Gillijns  
Profile: PhD student  
Skills: vortex matter in superconductor/ferromagnet nanostructures

35. Name: Stefanie Godefroo  
Profile: PhD student  
Skills: photoluminescence of semiconductor nanostructures in high fields

36. Name: Bart Laenens  
Profile: PhD student  
Skills: exchange bias anisotropy

37. Name: Alexander Malesevic  
Profile: PhD student  
Skills: growth and functional properties of carbon nanotubes

38. Name: Vasco Matias  
Profile: PhD student  
Skills: functional properties of gallium nitrides
39. Name: Thomas Nuytten  
Profile: PhD student  
Skills: photoluminescence of A\textsuperscript{III}B\textsuperscript{V} semiconductor nanostructures

40. Name: Kristof Paredis  
Profile: PhD student  
Skills: self-assembly, scanning tunneling microscopy

41. Name: Nikie Planckaert  
Profile: PhD student  
Skills: dynamical properties of thin films

42. Name: Nele Schildermans  
Profile: PhD student  
Skills: ratchet effects in nano-superconductors

43. Name: Koen Schouteden  
Profile: PhD student  
Skills: scanning tunneling spectroscopy of clusters on surfaces

44. Name: Stijn Vandezande  
Profile: PhD student  
Skills: magnetic nanostructures

45. Name: Joris Van de Vondel  
Profile: PhD student  
Skills: superconducting nanostructures, vortex matter in superconductors with periodic pinning centers

46. Name: Nele Veldeman  
Profile: PhD student  
Skills: reactivity of bimetallic clusters

47. Name: Huan Wang  
Profile: PhD student  
Skills: ion implantation

48. Name: Bram Willems  
Profile: PhD student  
Skills: thin films with superconducting nanograins in high magnetic fields

49. Name: Jürgen Linsingh  
Profile: Technician  
Skills: engineer – radiochemist, responsible for all radioactive treatments and source preparation (hyperfine interaction measurements)

50. Name: Philippe Mispelter  
Profile: Technician  
Skills: maintenance and support with respect to electrical and mechanical problems

51. Name: Annemie Morel  
Profile: Technician  
Skills: engineer, operator and technical supervision of the accelerators in the “Ion and Molecular Beam Laboratory” (ion implantation and ion beam analysis)
52. Name: Bastiaan Opperdoes  
   Profile: Technician  
   Skills: engineer in charge of the technical coordination in the “Ion and Molecular Beam Laboratory”

53. Name: Steven Piessens  
   Profile: Technician  
   Skills: engineer in charge of the technical support for the measurement equipment (scanning probe microscopes, lasers, ultra-high vacuum)

54. Name: Wim Meulemans  
   Profile: Secretary  
   Skills: administrative support

55. Name: Monique Van Meerbeek  
   Profile: Secretary  
   Skills: administrative support

56. Name: Jeroen Herczeg  
   Profile: Computer scientist  
   Skills: support for computer hardware and software, network manager
II. 4. PUBLICATIONS

Give a list of the most relevant 5 to 10 recent publications in direct relation with the proposed research.

1. Controlled multiple reversals of a ratchet effect
   C. C. de Souza Silva, J. Van de Vondel, M. Morelle, V.V. Moshchalkov

2. Hard-axis magnetization behavior and the surface spin-flop transition in antiferromagnetic Fe/Cr(100) superlattices

3. Quenching of the magnetic moment of a transition metal dopant in silver clusters
   E. Janssens, S. Neukermans, H.M.T. Nguyen, M.T. Nguyen, P. Lievens

4. The influence of surface steps on the formation of Ag-induced reconstructions on Si(111)
   K. Vanormelingen, K. Paredis, A. Vantomme

5. Positive domain wall resistance of 180° Néel walls in Co thin films
   Dieter Buntinx, Steven Brems, Alexander Volodin, Kristiaan Temst, Chris Van Haesendonck

6. Domain-wall superconductivity in superconductor-ferromagnet hybrids
   Z.R. Yang, M. Lange, A. Volodin, R. Szymczak, V.V. Moshchalkov,

7. Coiled carbon nanotubes as self-sensing mechanical resonators
   A. Volodin, D. Buntinx, M. Ahlskog, A. Fonseca, J.B.Nagy, C. Van Haesendonck

8. Extremely stable metal-encapsulated AlPb10+ and AlPb12+ clusters: mass-spectrometric discovery and density functional theory study
   S. Neukermans, E. Janssens, Z.F. Chen, R.E. Silverans, P.v.R. Schleyer, P. Lievens

8. Element- and size-dependent electron delocalization in AunX+ clusters (X = Sc, Ti, V, Cr, Mn, Fe, Co, Ni)
   S. Neukermans, E. Jansssens, H. Tanaka, R.E. Silverans, P. Lievens

10. Symmetry-induced formation of antivortices in mesoscopic superconductors
    L.F. Chibotaru, A. Ceulemans, V. Bruyndoncx, V.V. Moshchalkov
II. 5. INTERNATIONAL CONTACTS IN THE PROJECT’S RESEARCH DOMAIN

Mention the international contacts and the international networks to which the partner belongs within the context of the project.

International Networks

Bilateral Flanders-Poland Contract BIL 03/15 (1/1/2004-31/12/2006)
An Improved Understanding of Particle-induced Reactions and Interactions at Surfaces: Towards a new Generation of Ultra-sensitive Nanoprobes

Bilateral Flanders-Poland Contract BIL 03/16 (1/1/2004-31/12/2006)
Local Magnetism in Spintronics and Exchange biased Systems studied by Nuclear Magnetic Resonance
C. Van Haesendonck (K.U.Leuven), J. De Boeck / W. Vanroy (Imec), E. Jedryka (Warszawa)

Bilateral Flanders-China Contract BIL 02/01 (01/01/2003-31/12/2006)
Development of Pulsed Magnets for Very Strong Magnetic Fields
Y. Bruynseraede, J. Vanacken, J. Van Humbeeck, F. Herlach, G. Cheng-lin (HUST), P. Yuan (HUST), F. Ming-Wu (HUST)

Bilateral Flanders-China Contract BIL 04/03 (01/01/2005-31/12/2006)
Nanostructured Superconductors
V.V. Moshchalkov (K.U.Leuven), M.J. Van Bael (K.U.Leuven), F. Brosens (U.A.), Z.X. Zhao (Beijing)

Bilateral Flanders-Russia Contract BIL/05/25 (01/01/2006-31/12/2007)
Nanostructured Superconductors and Superconductor/Ferromagnet Hybrids
V.V. Moshchalkov (K.U.Leuven), M. Morelle (K.U.Leuven), A. Aladyshkin (K.U.Leuven), A. Mel'nikov (Nizhny Novgorod)

Bilateral Flanders-Russia Contract BIL/05/26 (01/01/2006-31/12/2007)
Low Temperature Scanning Probe Microscopy and Spectroscopy of Defects and Impurities in Semiconductors
C. Van Haesendonck (K.U.Leuven), V.I. Panov (Moscow)

Bilateral Flanders-Chili Contract BIL/05/04 (01/01/2006-31/12/2007)
Quantum Transport and Magnetic Spin Structures in Nanogranular Cluster Deposits
P. Lievens, K. Temst (K.U.Leuven), W. Magnus (Imec), M. Kiwi (PUC, Santiago de Chile)

Bilateral Flanders-CNRS France Contract Tournesol 2006, T2005.05 (01/01/2006-31/12/2006)
Hall Effect in the Field Induced normal State of high Temperature Superconductors
V.V. Moshchalkov (K.U.Leuven), G. Rikken (France)

Bilateral Flanders-China Contract BIL/04/05 (01/01/2005-31/12/2006)
Magnetic structure and magnetic properties of ion beam processed III-nitride semiconductors
A. Vantomme (K.U.Leuven), S. Yao (Peking University, Beijing)

Bilateral Flanders - South Africa BIL/04/47 (01/01/2005-31/12/2006)
Controlling phase formation by reactive deposition and mixing
A. Vantomme (K.U.Leuven), C. Comrie (Univ. of Cape Town)
International Collaborations (excluding International Networks)

EUROPE

- Markus Ahlskog (University of Jyväskylä, Finland), *Electrical, mechanical and electromechanical properties of carbon nanotubes*
- Farkhad Aliev (University of Madrid, Spain), *Vortex dynamics, vortex ratchets*
- Dimitri Arvanitis (Uppsala University, Sweden), *Synchrotron measurements (XAS and XMCD) on exchange bias bilayers*
- Antonio Barone (University of Naples, Italy), *Josephson effect*
- V. Bellini (Natl Res Ctr Nanostruct & Biosyst Surfaces, Modena, Italy), *Ab initio calculations of hyperfine interactions*
- Simon Bending (University of Bath, UK), *Scanning Hall probe microscopy*
- Alexander Buzdin (University of Bordeaux, France), *Vortex matter – theory*
- Oystein Fischer (University of Geneva, Switzerland), *STM and AFM studies of superconductors*
- J. Korecki (Institute of Catalysis and Surface Chemistry, Poland), *Magnetism in Cr-based systems*
- K.P. O'Donnell (Univ. of Strathclyde, Scotland), *EL and PL on rare-earth doped semiconductors*
- B. Sepiol (Univ. of Wien, Austria), *Synchrotron nuclear resonant scattering studies of self-diffusion*
- Roger Woerdenweber (Forschungszentrum Juelich, Germany), *Nanosuperconductors*

USA/Canada

- Helmut Fritzche (National Research Council Canada, Chalk River, Canada), *Polarized neutron reflectivity of thin-film patterns of dilute magnetic alloys and ferromagnets*
- Vitaly Metlushko (University of Chicago, USA), *Magnetic nanostructures*
- Paul von Ragüe Schleyer (University of Georgia, Athens, USA), *Ab initio calculations of clusters*
- Ivan K. Schuller (University of California at San Diego, U.S.A.), *Thin-film growth and magnetism, exchange bias effects*

ASIA

- Takekazu Ishida (University of Osaka, Japan), *Superconductor/Ferromagnet hybrids*
- Kazuo Kadowaki (University of Tsukuba, Japan), *Vortex patterns in nanosuperconductors*
- Akira Tonomura (Hitachi Advanced Research Laboratory, Japan), *Lorentz microscopy*
- M.F. Wu (Peking University, China), *Ion implantation, silicides*
II. 6. CONTRACTS IN PROGRESS IN THE PROJECT’S RESEARCH DOMAIN

Give the list of research projects currently carried out in the field of the project with the duration and the funding source (Belgium’s Federal Government, Communities and Regions or by the European Union,…).

Belgian Federal Government

Belgian Science Policy Interuniversity Attraction Poles Contract IUAP-P5/01(01/01/2002-31/12/2006)
Quantum Size Effects in Nanostructured Materials
Y. Bruynseraede, UCL, UA, ULB, VUB, UG, LUC, Göteborg, Aachen

Belgian Science Interuniversity Attraction Poles Contract IUAP-P3/02(01/01/2004-31/12/2007)
Quantum Size Effects in Nanostructured Materials
Y. Bruynseraede, UCL, UA, ULB, VUB, UG, LUC, Göteborg, Aachen

Flemish Community

FWO Contract G.0182.03 (01/01/2003-31/12/2006)
Mass Selective Deposition of Metal Clusters: Physical Properties of Individual and Interacting Nanoparticles
P. Lievens, R.E. Silverans, C. Van Haesendonck, K. Temst

FWO Contract G.0449.04 (01/01/2004-31/12/2007)
Influence of Crystal Defects and Interface Roughness on the Magnetism of Mesoscopic Ferromagnets and Dilute Magnetic Alloys
C. Van Haesendonck, K. Temst, A. Brosens (UA), V. Fomin (UA)

FWO Contract G.0484.04 (01/01/2004-31/12/2007)
Spin Polarization Effects in Semiconductors with Arrays of Magnetic Ions and Clusters
V.V. Moshchalkov, F. Peeters (UA), G. Borghs (IMEC), J. De Boeck (IMEC), J. Vanacken

FWO Contract G.0491.04 (01/01/2004-31/12/2007)
Hall Probe Microscopy of Nanostructured Magnetic and Superconducting Materials
V.V. Moshchalkov, J. De Boeck (IMEC), G. Borghs (IMEC)

FWO Contract G.0492.04 (01/01/2004-31/12/2007)
Binary Nanoclusters in the Gas Phase and Molecular Fragments Desorbed from Nanolayers: Laser Spectroscopic and Mass Spectrometric Research
R.E. Silverans, P. Lievens, E. Vandeweert

FWO-WOG Contract WO.035.04N (01/01/2004-31/12/2008)
Hybrid Systems at Nanometer Scale
C. Van Haesendonck, V.V. Moshchalkov, R.E. Silverans, P. Lievens, J.O. Indekeu, F. Brosens (UA), F. Peeters (UA), G. Borghs (IMEC), P. Wagner (LUC), P.H. Kes (Leiden), P. Koenraad (Eindhoven), L. Piraux (L.La-Neuve), G. Güntherodt (Aachen), P. Lambin (Namur), M. Hou (ULB)

FWO Contract G.0212.05 (01/01/2005-31/12/2008)
Electron Spectroscopy on Nanoscale Size of Organic Layers on Oxide Surfaces
H. Terryn (VUB), A. Hubin (VUB), E. Vandeweert

FWO Contract G.0238.05 (01/01/2005-31/12/2008)
Reactivity and Catalytic Activity of Bimetallic Nanoclusters: Gas Phase Experiments and Quantum Chemical Computations
P. Lievens, Minh Tho Nguyen

FWO Contract G.0449.05 (01/01/2005-31/12/2008)
Electrical and Magnetic Measurements at Nanometer Scale with Scanning Probes
C. Van Haesendonck, W. Vandervorst (IMEC), A. Volodin

FWO Contract G.0450.05 (01/01/2005-31/12/2008)
Role of the Incorporation of Ni or Fe on the Relation between Microstructure and Electrical Properties of Cobalt Silicide
A. Vantomme, C. Van Haesendonck, A. Falepin, K. Temst

FWO Contract G.0356.06 (01/01/2006-31/12/2009)
Nanoscale Condensate and Flux Confinement in Superconductors
V.V. Moshchalkov, M.J. Van Bael, F. Peeters (UA), J. Tempère (UA)

Exploration of new applications for nuclear probes in the study of low-dimensional systems
A. Vantomme, S. Cottenier, C. L’Abbé, J. Meersschaut, M. Rots

FWO Contract G.0447.05 (2005-2008)
Orbital magnetisme en de LDA+U-methode in realistische materialen
M. Rots, S. Cottenier

FWO Contract G.0237.05 (2005-2008)
Invloed van spinfluctuaties en dynamische roostervorming op de Ginzburg-Landauparameters voor de onconventionele supergeleider Sr-2RuO-4
J. Indekeu, S. Cottenier

FWO-Vlaanderen (2002-2007)
Vorming en herstel van roosterschade bij (gekanaliseerde) implantatie in groep III-nitrides
A. Vantomme, H. Pattyn, M. Rots

Flemish Concerted Action Program Contract GOA/2004/02 (01/01/2004-31/12/2008)
Magnetism and Superconductivity in Hybrid Nanosystems
V.V. Moshchalkov, J.O. Indekeu, P. Lievens, M. Rots, R.E. Silverans, C. Van Haesendonck, A. Vantomme

IDO/02/006 Contract (01/10/2003-30/09/2006)
Zelfasssemblage van het Neuroskelet en Geassocieerde Cellulaire Structuren: in-Vitro en ex-Vivo Analyse van Moleculaire en Biologische Nanostructuren
C. Van Haesendonck, Y. Engelborghs, J. Winderickx, F. Van Leuven, D. Terwel

Flemish VIS Project Contract VIS 03/002 (01/02/2004-31/07/2006)
Nanostructured Superconductors: From Quantum Design of Critical Parameters to Fluxonics
V.V. Moshchalkov

IDO/04/009 Contract (01/01/2005-30/09/2008)
Het Gebruik van Magnetische Velden in de Reductie van de Deeltjesgrootte van Slecht Oplosbare Farmaca
J. Van Humbeeck, P. Augustijns, J. Martens, V.V. Moshchalkov, J. Vermant

INPAC Contract EF/05/005 (01/11/2005-31/10/2010)
Nanoscale Physics and Chemistry - Institute for Nanoscale Physics and Chemistry (INPAC)
V.V. Moshchalkov, A. Ceulemans, M. Van der Auweraer, C. Van Haesendonck, A. Vantomme, K. Clays, P. Lievens, A. Stesmans, J. Vanderleyden

IWT-SBO Contract IWT 030219 (01/10/2003-30/09/2007)
CVD Diamond: a Novel Multifunctional Material for High Temperature Electronics, High Power/High Frequency Electronics and Bioelectronics

L. De Schepper (LUC), M. D’Olieslaeger (LUC-IMOMEC), C. Van Haesendonck, P. Clauws (UGent), M. Ameloot (LUC)

European Union

EU Contract HPRN-CT-2002-00328 (01/10/2002-30/09/2006)
Monodispersed Inorganic Nanoclusters as Building Blocks for Functional Materials (NanoCluster)
P. Lievens, Birmingham, Kassel, UA, TRC Finland, CSIC Spain

EU Contract NMP4-CT-2004-500101 (1/7/2004-30/6/2008)
Self-Assembled semiconductor Nanostructures for new Devices in photonics and Electronics (SANDIE) in the 6th Framework Programme for Research

EU Contract 506239 (01/01/2005-31/12/2008)
A coordinated approach to access, experimental development and scientific exploration of european large infrastructures for high magnetic fields (EuroMagNET)
Radboud Univ. Nijmegen, V.V. Moshchalkov, Israel, France, Germany, Estonia, U.K., Spain

Dynamics in nano-scaled materials studied with synchrotron radiation (DYNASYNC)
Cracow, Wien, Grenoble, Hamburg, J. Meersschaut, Cracow, Budapest
II. 7. WORKPACKAGES IN WHICH THE PARTNER IS PARTICIPATING

1. Workpackage number and title: 1. Metallic and oxide clusters
2. Workpackage number and title: 2. Magnetic dots and wires
3. Workpackage number and title: 3. Semiconductor quantum dots and wires
4. Workpackage number and title: 4. Superconducting nanosystems
5. Workpackage number and title: 5. Carbon nanotubes and related materials
II. 8. BUDGET (distribution per year) *

(in EURO, without decimals)

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* This table should not be completed by the European partner as his/her budget is mentioned in the budgetary table of the Belgian partner of the network responsible for the follow-up of the partnership.
- **Personnel**: indexed gross remunerations; employer’s social contributions; statutory insurance costs as well as any other compensation or allocation legally due in addition to the salary; the reimbursements for PhD and postdoctoral grant holders (exempt from tax and benefiting from social security). Personnel costs must account for minimum 60% of the total budget attributed to each partner of the network. The costs for the tax-free PhD grants and postdoctoral grants may not account for more than 60% of the total personnel costs.

- **Operating costs**: documentation; travel and accommodation; hosting of visiting foreign researchers; use of computing facilities; software; telecommunications; maintenance and operation of equipment and, more generally, consumables.

- **Equipment**: acquisition and installation of scientific and technical appliances and instruments, including IT equipment placed at the project’s disposal. Equipment cannot be asked for during the last year of the programme.

- **Overheads**: general expenses of the institutions covering, on an inclusive basis, administrative, telephone, postal, maintenance, heating, electricity, rental, material depreciation and insurance costs. The total amount for this heading may not exceed 5% of total personnel and operating costs.

- **Subcontracting**: costs incurred by a third party in order to perform tasks or provide services necessitating specific scientific or technical skills outside the normal framework of the institution’s activities. Each request for subcontracting needs a approval from the programme administrator.
II. 9. EQUIPMENT

Indicate the equipment (with an estimation of the cost) that will be purchased from the IAP-budget for the coming from four years (2007-2010) and justify.

The KULeuven partner plans to invest in the period 2007-2010 from the IAP budget a total amount of 370.625 EUR to expand the experimental facilities for the characterization and physical measurements of clusters and nanowires.

1. In order to be able to study the magnetic and electronic properties of free clusters, the existing ultra-high vacuum (UHV) facility will be equipped with a magnetic deflection setup (Stern-Gerlach type configuration) and a photo-electron spectrometer (WP1, WP2, WP4). This requires a total investment of about 185.000 EUR. 92.656,25 EUR of this investment will be financed via the IAP budget.

2. Since scanning probe microscopes are unique tools to investigate clusters and nanowires down to the nanometer scale and even below, three investments will be devoted to extending and upgrading the existing facilities (WP1, WP2, WP3, WP4, WP5).
   - Low-temperature scanning tunneling microscopy (STM) with helium-3 cryostat (temperatures down to 0.33 K) with spin polarization option. This requires a total investment of about 280.000 EUR. 92.656,25 EUR of this investment will be financed via the IAP budget.
   - Upgrade and extension of the large-stage UHV STM setup for "in situ" measurements in the "Ion and Molecular Beam Laboratory": (i) upgrade of the control system (existing control system is outdated and has several malfunctions), and (ii) extension of the hardware of the microscope with atomic force microscopy (AFM), which significantly broadens the scope of applications (e.g. to insulating and ferromagnetic materials). This requires a total investment of about 220.000 EUR. 92.656,25 EUR of this investment will be financed via the IAP budget.
   - Extension of the existing AFM facilities: (i) optical interferometric force detection for low-temperature magnetic force microscopy (MFM), and (ii) multimode high-resolution AFM for sample characterization at room temperature. This requires a total investment of about 160.000 EUR. 92.656,25 EUR of this investment will be financed via the IAP budget.
II. 10. SUBCONTRACTING

To be completed only if subcontracting is foreseen.

Describe and justify the tasks and/or services that will be provided by a third party.