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DIREZIONE GENERALE RICERCA
PROGETTO DI RICERCA - MODELLO B
BANDO FIRB - PROGRAMMA "FUTURO IN RICERCA"

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Linea d'intervento 1

1 - Associated Investigator of the Research Unit Program

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Dottore di ricerca		06/06/1977
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2 - Research Program Description and Research Unit Duties

The Research Unit is composed by staff of the University of Ferrara:

The members of this Research Unit are involved since many years and with different duties in the field of nucleon spin physics. In particular they are specialized in the technological development of polarized Atomic Beam Sources (ABS):

Luciano PappalarDO (Responsible of the Research Unit)

- began his scientific activity in the framework of the experimental nuclear astrophysics, contributing to several experiments (in Italy and abroad) aimed to the study of nuclear reactions at astrophysically relevant (low) energies.

As a PhD student he worked on the study of transverse spin and momentum effects of the nucleon at the HERMES experiment (DESY, Hamburg). During 2005-2006 he actively contributed to the assembly and the characterization of the superconducting solenoidal magnet of the HERMES recoil detector and was co-responsible for the HERMES Unpolarized Gas Feed System. In these years he also contributed to the technological development of the two Atomic Beam Sources located at the SPINLAB laboratory of the University of Ferrara.

- Prof. Paolo Lenisa has been responsible in the period 2000-2005 for the polarized gas target of the HERMES experiment at HERA (DESY, Amburg). The complex apparatus of the HERMES target includes a polarized Atomic Beam Source, a storage cell and diagnostic devices used to monitor the atomic dissociation and the polarization of the gas. The excellent performance of the HERMES target (in term of intensity and polarization) allowed to measure several important observables related to the longitudinal and transverse spin of the proton.

Currently he is co-spokeperson for the PAX project. PAX aims to measure the poorly known transverse spin distribution of the nucleon (Transversity) through the study of Drell-Yan processes with transversely polarized proton and anti-proton colliding beams. Dedicated experiments (preparatory to PAX), aimed to demonstrate for the first time the possibility of creating polarized anti-proton beams, are being performed at the COSY storage ring (Juelich) and forseen at AD (CERN).

- Prof. Giuseppe Ciullo is responsible for the two Atomic Beam Sources

at the SpinLab laboratory in Ferrara. He actively contributed to the assembly and running of the complex apparatus of the HERMES target. He was also responsible for the construction, characterization and optimization of the HERMES storage cells in the period 2000 - 2007.

Recently he is directly involved in the R&D of the storage cells to be employed in the PAX experiment. He is currently responsible for the Breit-Rabi Polarimeter operating at the ABS installed at COSY (Juelich).

- Doct. Marco Statera has recently got a permanent position at Physics Department of Ferrara as qualified technician. He has a great experience in the fields of superconducting magnets, cryogenics and vacuum techniques. In the period 2005 - 2007, he was responsible for the assembly and running of the superconducting magnet of the HERMES Recoil Detector.

He is currently responsible for an apparatus (realized by himself at SpinLab) aimed to the tridimensional mapping of magnetic fields produced by superconducting magnets. In addition he is co-responsible, together with Prof. Ciullo, for the Breit-Rabi Polarimeter operating at the ABS installed at COSY (Juelich).

The goal of the Research Unit is the technological development of a polarized gas target to be used in the study of the proposed polarized nuclear reactions. To this aim, the Research Unit will make use of several devices already existent at the SpinLab laboratory of the University of Ferrara. The SpinLab laboratory hosts two Atomic Beam Sources called ABS1 and ABS2, respectively. Only the ABS2 however is provided with a Stern-Gerlach device able to produce polarized atomic beams. ABS2 consists of five vacuum chambers. A radio-frequency dissociator dissociates the molecular hydrogen and deuterium gas injected into the system. The passage of the gas through a nozzle and a skimmer allows the formation of an atomic beam. Atoms in the spin state $+1/2$ are focused by two sets of permanent sextupolar magnets, while those in the spin state $-1/2$ are defocused and thus removed from the beam. Two radio-frequency units induce hyperfine transitions in order to select an atomic beam in a specific nuclear polarization state. Such a beam will be then injected in the storage cell which will represent the polarized target for the nuclear reaction to be studied. The pumping system includes six pumps located in the various chambers in such a way to achieve a proper pressure gradient. An interlock acts on the opening/closing of vacuum gate valves. The current acquisition system is based on the Labview software and is installed on a personal computer of SpinLab. Data are stored on a dedicated server.

Currently the ABS2 is not equipped with diagnostic systems able to monitor the atomic dissociation level, the intensity, the composition and the polarization of the

produced atomic beam. Furthermore, the acquisition system in use is very basic.

For the measurements proposed in the present project, the ABS2 needs to be substantially upgraded. In particular:

1. provide the ABS2 with proper diagnostic systems: a Quadrupole Mass Analyzer (QMA), and a device for time of flight (TOF) measurements;
2. install a new power supply for the radio-frequency dissociator;
3. replace one of the cold-heads (cryogenic pumps);
4. install a system for the regulation and the monitoring of the nozzle temperature (which is one of the fundamental parameter for the beam formation);
5. enforce the current vacuum monitoring system with the addition of pressure gauges and a RS232 standard multi-gauge reader;
6. install a flow-controller for each of the gas inlets;
7. install a remotely controlled 40mm CF gate-valve (to isolate the scattering chamber from the ABS)
8. implement a new (more flexible) programmable interlock based on the PLC technology
9. upgrade the current acquisition system with the implementation of the new devices to be installed on the ABS.

Part of the mentioned devices are already available since currently running on the ABS1 (thus at zero cost for the project). Other devices will be bought. The polarimeter, which is needed to measure the polarization of the atomic beam, is provided by the collaborators from the IKP FZ Institute of Juelich. Once upgraded, the whole apparatus of the ABS2 will be optimized in order to find the ideal operational conditions.

Contemporary to the upgrade of the ABS2, the research Unit foresees to design and develop a storage cell for the polarized gas produced by the ABS2. The use of the storage cell will enhance by up to two orders of magnitude the target density, resulting in clear benefits for the luminosity of the whole apparatus. The choice a suitable material of the cell walls is very important in order to reduce as much as possible the depolarization effects on the stored gas. Furthermore, the walls must be very thin in order to reduce the multiple-scattering effects and the loss of energy of the particles emitted from the interaction region. A technological solution that accounts for both requirements has recently been realized for the PAX project: a prototype Teflon storage cell with 5 micron thick walls. The same technology can thus be exploited for the present case.

The members of the Research Unit are actively involved in experiments with nuclear polarized gas target and have the technological skills needed for the upgrades and the optimization of the apparatus described above.

During the first year of activity the ABS2 apparatus will be upgraded with the installation of the requested diagnostic devices (part of which currently running on the ABS1) and completed with the missing devices to be purchased. During this year the Teflon storage cell will be designed and realized.

During the second year all needed tests and optimizations (especially those concerning the atomic dissociation and the intensity of the beam) will be performed at the SpinLab laboratory in Ferrara. The whole apparatus will be then moved to the Gatchina laboratory and assembled together with the polarimeter (from Juelich) and the storage cell. Then the first set of tests with the full target apparatus will be performed.

During the third year the optimization of the apparatus will be completed and the first runs of nuclear reaction measurements performed.

The fourth year will be dedicated to finalized the measurements, analyze the data and publish the results.

3 - ERC (European Research Council) research fields

PE Mathematics, physical sciences, information and communication, engineering, universe and earth sciences

PE2 Fundamental constituents of matter: high energy, particle, nuclear, plasma, atomic, molecular, gas, and optical physics

PE2_4 Nuclear physics

PE2_5 Gas and plasma physics

PE7 Universe science: astro-physics/chemistry/biology/geology; solar system; stellar, galactic and extragalactic astronomy, cosmology; space science, instrumentation

PE7_14 Cosmology

4 - Scientific Curriculum of the Associated Investigator of the Research Unit Program

Luciano Pappalardo was born in Catania (Italy) on June 6th, 1977. He graduated in Physics with 110/110 cum laude at University of Catania, Catania (Italy) in April 28, 2003 defending a thesis in Experimental Nuclear Astrophysics titled: "Extraction of the astrophysical S-factor and the electron screening potential for the reaction $6\text{Li}+p \rightarrow 4\text{He}+3\text{He}$ via the Trojan Horse Method".

He got a 12 months INFN fellowship for undergraduated students at LNS.

From September 2003 to October 2004 he worked as Graduate Assistant-Researcher within the Experimental Nuclear Astrophysics Program of the Cyclotron Institute, Texas A&M University, College Station, Texas (USA).

In November 2004 he got the position of PhD Student in Physics (XX Ciclo) at University of Ferrara (Italy), achieving the highest grade (113/120) among the candidates.

In 2005 he got a 3-weeks fellowship at Tokyo Institute of Technology (Tokyo, Japan) within the framework of the Foreign Graduate student Invitation Program (FGIP)

In March 26th, 2008 he got the PhD in Physics (grade: excellent) with the thesis: "Transverse spin effects in polarized semi inclusive deep inelastic scattering". The thesis was judged the best one among those defended in Physics at University of Ferrara in 2008 and was published on the *Annales of the University*. He was awarded with the national INFN prize "Premio Nazionale Claudio Villi 2008" for the best PhD thesis in Nuclear Physics.

In February 2008 he got a 18-months post-doc position at University of Ferrara.

He is author of 8 scientific articles on specialized International journals with referee and of several International conference proceedings and INFN-LNS Activity Reports.

Brief summary of the research activity:

He began his scientific activity in the framework of the experimental nuclear astrophysics, contributing to several experiments (in Italy and abroad) aimed to the study of nuclear reactions at astrophysically relevant (low) energies.

As a PhD student he worked on the study of transverse spin and momentum effects of the nucleon at the HERMES experiment (DESY, Hamburg). In particular he extracted, from data collected with a transversely polarized target, two relevant azimuthal asymmetries of the cross section which carry information on two poorly known fundamental distribution functions of the nucleon: the Sivers function and the Transversity. During 2005-2006 he actively contributed to the assembly and the characterization of the superconducting solenoidal magnet of the HERMES recoil detector and was co-responsible for the HERMES Unpolarized Gas Feed System. In these years he also contributed to the technological development of the two Atomic Beam Sources located at the SpinLab laboratory of the University of Ferrara.

His results were presented in several International conferences:

1. "Transversity results from HERMES" @ XIV International Workshop on DIS, Tsukuba, Giappone 20-24/04/06.
2. "Status of Transversity studies at HERMES" @ Caucasian-German Workshop on Hadron Physics, Tbilisi, Georgia 4-8/09/06.
3. "Latest HERMES Results on Transverse-Spin Effects in Hadron Structure and Formation" @ XII International Conference on Hadron Spectroscopy - HADRON07 LNF, Frascati (Roma) 8-13/10/07
4. "Measurements of Collins and Sivers asymmetries at HERMES" @ Second International Workshop on Transverse Polarization Phenomena in Hard Processes (Transversity 2008) Ferrara 26-31/05/08
5. "Transversity at HERMES" @ Workshop on Hard Exclusive Reactions. Trento 9-13/06/08

5 - Most significant scientific publications of the Associated Investigator of the Research Unit Program

n°	Publication
1.	A. Airapetian, N. Akopov, Z. Akopov, E.C. Aschenauer, W. Augustyniak, A. Avetissian, E. Avetissian, L. Barion, S. Belostotski, N. Bianchi, H.P. Blok, H. Böttcher, C. Bonomo, A. Borissov, V. Bryzgalov, J. Burns, M. Capiluppi, G.P. Capitani, E. Cissani, G. Ciullo, M. Contalbrigo, P.F. Dalpiaz, W. Deconinck, R. De Leo, M. Demey, L. De Nardo, E. De Sanctis, M. Diefenthaler, P. Di Nezza, J. Dreschler, M. Düren, M. Ehrenfried, G. Elbakian, F. Ellinghaus, R. Fabbri, A. Fantoni, S. Frullani, D. Gabbert, G. Gapienko, V. Gharibyan, F. Giordano, S. Gliske, H. Guler, C. Hadjidakis, D. Hasch, G. Hill, A. Hillenbrand, M. Hoek, I. Hristova, Y. Imazu, A. Ivanilov, H.E. Jackson, S. Joosten, R. Kaiser, T. Keri, E. Kinney, A. Kisselev, M. Kopytin, V. Korotkov, P. Kravchenko, V.G. Krivokhijine, L. Lagamba, R. Lamb, L. Lapikas, I. Lehmann, P. Lenisa, L.A. Linden-Levy, A. Lopez Ruiz, W. Lorenzon, S. Lu, X. Lu, D. Mahon, N.C.R. Makins, B. Marianski, H. Marukyan, C.A. Miller, Y. Miyachi, V. Muccifora, M. Murray, A. Mussgiller, E. Nappi, Y. Naryshkin, A. Nass, M. Negodaev, W.-D. Nowak, PAPPALARDO L., R. Perez-Benito, N. Pickert, M. Raithe, P.E. Reimer, A.R. Reolon, C. Riedl, K. Rith, S.E. Rock, G. Rosner, A. Rostomyan, L. Rubacek, J. Rubin, D. Ryckbosch, Y. Salomatin, A. Schäfer, G. Schnell, K.P. Schuler, B. Seitz, C. Shearer, T.-A. Shibata, V. Shutov, M. Stancari, M. Statera, J.J.M. Steijger, H. Stenzel, J. Stewart, F. Stinzing, J. Streit, S. Taroian, E. Thomas, A. Trzcinski, M. Tytgat, A. Vandenbroucke, P.B. van der Nat, G. van der Steenhoven, Y. van Haarlem, C. van Hulse, M. Varanda, D. Veretennikov, V. Vikhrov, I. Vilardi, C. Vogel, S. Wang, S. Yaschenko, H. Ye, Z. Ye, S. Yen, W. Yu, D. Zeiler, B. Zihlmann, P. Zupranski (2008). Cross-sections for hard exclusive electroproduction of π^+ mesons on a hydrogen target. PHYSICS LETTERS. SECTION B, vol. 659; p. 486-492, ISSN: 0370-2693
2.	A. Airapetian, N. Akopov, Z. Akopov, A. Andrus, E.C. Aschenauer, W. Augustyniak, R. Avakian, A. Avetissian, E. Avetissian, S. Belostotski, N. Bianchi, H.P. Blok, H. Böttcher, C. Bonomo, A. Borissov, A. Brüll, V. Bryzgalov, J. Burns, M. Capiluppi, G.P. Capitani, E. Cissani, G. Ciullo, M. Contalbrigo, P.F. Dalpiaz, W. Deconinck, R. De Leo, M. Demey, L. De Nardo, E. De Sanctis, M. Diefenthaler, P. Di Nezza, J. Dreschler, M. Düren, M. Ehrenfried, A. Elalaoui-Moulay, G. Elbakian, F. Ellinghaus, U. Elschenbroich, R. Fabbri, A. Fantoni, L. Felawka, S. Frullani, A. Funel, D. Gabbert, G. Gapienko, V. Gharibyan, F. Giordano, S. Gliske, I.M. Gregor, H. Guler, C. Hadjidakis, D. Hasch, T. Hasegawa, W.H.A. Hesselink, G. Hill, A. Hillenbrand, M. Hoek, Y. Holler, B. Hommel, I. Hristova, G. Iarygin, Y. Imazu, A. Ivanilov, A. Izotov, H.E. Jackson, A. Jgoun, S. Joosten, R. Kaiser, T. Keri, E. Kinney, A. Kisselev, T. Kobayashi, M. Kopytin, V. Korotkov, V. Kozlov, P. Kravchenko, V.G. Krivokhijine, L. Lagamba, R. Lamb, L. Lapik s, I. Lehmann, P. Lenisa, P. Liebing, L.A. Linden-Levy, A. Lopez Ruiz, W. Lorenzon, S. Lu, X.-R. Lu, B.-Q. Ma, D. Mahon, B. Maiheu, N.C.R. Makins, L. Manfr , Y. Mao, B. Marianski, H. Marukyan, V. Mexner, C.A. Miller, Y. Miyachi, V. Muccifora, M. Murray, A. Mussgiller, A. Nagaitsev, E. Nappi, Y. Naryshkin, A. Nass, M. Negodaev, W.-D. Nowak, A. Osborne, PAPPALARDO L., R. Perez-Benito, N. Pickert, M. Raithe, D. Reggiani, P.E. Reimer, A. Reischl, A.R. Reolon, C. Riedl, K. Rith, S.E. Rock, G. Rosner, A. Rostomyan, L. Rubacek, J. Rubin, D. Ryckbosch, Y. Salomatin, I. Sanjiev, A. Schäfer, G. Schnell, K.P. Schler, B. Seitz, C. Shearer, T.-A. Shibata, V. Shutov, M. Stancari, M. Statera, E. Steffens, J.J.M. Steijger, H. Stenzel, J. Stewart, F. Stinzing, J. Streit, P. Tait, S. Taroian, B. Tchuiko, A. Terkulov, A. Trzcinski, M. Tytgat, A. Vandenbroucke, P.B. van der, G. van der, Y. van Haarlem, C. van Hulse, M. Varanda, D. Veretennikov, V. Vikhrov, I. Vilardi, C. Vogel, S. Wang, S. Yaschenko, H. Ye, Y. Ye, Z. Ye, S. Yen, W. Yu, D. Zeiler, B. Zihlmann, P. Zu... (2008). Measurement of parton distributions of strange quarks in the nucleon from charged-kaon production in deep-inelastic scattering on the deuteron. PHYSICS LETTERS. SECTION B, vol. 666; p. 446-450, ISSN: 0370-2693, doi: 10.1016/j.physletb.2008.07090
3.	HERMES collaboration, A. Airapetian, N. Akopov, Z. Akopov, A. Andrus, E.C. Aschenauer, W. Augustyniak, R. Avakian, A. Avetissian, E. Avetisyan, L. Barion, S. Belostotski, N. Bianchi, H.P. Blok, H. Böttcher, C. Bonomo, A. Borissov, A. Brüll, V. Bryzgalov, J. Burns, M. Capiluppi, G.P. Capitani, E. Cissani, G. Ciullo, M. Contalbrigo, P.F. Dalpiaz, W. Deconinck, R. De Leo, M. Demey, L. De Nardo, E. De Sanctis, M. Diefenthaler, P. Di Nezza, J. Dreschler, M. Düren, M. Ehrenfried, G. Elbakian, F. Ellinghaus, U. Elschenbroich, R. Fabbri, A. Fantoni, L. Felawka, S. Frullani, A. Funel, D. Gabbert, G. Gapienko, V. Gharibyan, F. Giordano, S. Gliske, H. Guler, C. Hadjidakis, D. Hasch, T. Hasegawa, G. Hill, A. Hillenbrand, M. Hoek, Y. Holler, I. Hristova, G. Iarygin, Y. Imazu, A. Ivanilov, A. Izotov, H.E. Jackson, A. Jgoun, S. Joosten, R. Kaiser, T. Keri, E. Kinney, A. Kisselev, M. Kopytin, V. Korotkov, V. Kozlov, P. Kravchenko, V.G. Krivokhijine, L. Lagamba, R. Lamb, L. Lapikas, I. Lehmann, P. Lenisa, L.A. Linden-Levy, W. Lorenzon, S. Lu, X. Lu, B.-Q. Ma, D. Mahon, B. Maiheu, N.C.R. Makins, Y. Mao, B. Marianski, H. Marukyan, C.A. Miller, Y. Miyachi, V. Muccifora, M. Murray, A. Mussgiller, A. Nagaitsev, E. Nappi, Y. Naryshkin, A. Nass, M. Negodaev, W.-D. Nowak, A. Osborne, PAPPALARDO L., R. Perez-Benito, N. Pickert, M. Raithe, P.E. Reimer, A. Reischl, A.R. Reolon, C. Riedl, K. Rith, S.E. Rock, G. Rosner, A. Rostomyan, L. Rubacek, J. Rubin, A.L. Ruiz, D. Ryckbosch, Y. Salomatin, I. Sanjiev, A. Schäfer, G. Schnell, K.P. Schuler, B. Seitz, C. Shearer, T.-A. Shibata, V. Shutov, M. Stancari, M. Statera, E. Steffens, J.J.M. Steijger, H. Stenzel, J. Stewart, F. Stinzing, P. Tait, S. Taroian, A. Terkulov, A. Trzcinski, M. Tytgat, A. Vandenbroucke, P.B. van der Nat, G. van der Steenhoven, Y. Van Haarlem, C. Van Hulse, M. Varanda, D. Veretennikov, V. Vikhrov, I. Vilardi, C. Vogel, S. Wang, S. Yaschenko, H. Ye, Z. Ye, S. Yen, W. Yu, D. Zeiler, B. Zihlmann, P. Zupranski (2008). Measurement of azimuthal asymmetries with respect to both beam charge and transverse target polarization in exclusive electroproduction of real photons. JOURNAL OF HIGH ENERGY PHYSICS, vol. 06; p. 066-1-066-24, ISSN: 1126-6708, doi: 10.1088/1126-6708/2008/06/066
4.	HERMES collaboration, A. Airapetian, N. Akopov, Z. Akopov, A. Andrus, E.C. Aschenauer, W. Augustyniak, R. Avakian, A. Avetissian, E. Avetisyan, L. Barion, S. Belostotski, N. Bianchi, H.P. Blok, H. Böttcher, C. Bonomo, A. Borissov, A. Brüll, V. Bryzgalov, J. Burns, M. Capiluppi, G.P. Capitani, E. Cissani, G. Ciullo, M. Contalbrigo, P.F. Dalpiaz, W. Deconinck, R. De Leo, M. Demey, L. De Nardo, E. De Sanctis, M. Diefenthaler, P. Di Nezza, J. Dreschler, M. Düren, M. Ehrenfried, G. Elbakian, F. Ellinghaus, U. Elschenbroich, R. Fabbri, A. Fantoni, L. Felawka, S. Frullani, A. Funel, D. Gabbert, G. Gapienko, V. Gharibyan, F. Giordano, S. Gliske, H. Guler, C. Hadjidakis, D. Hasch, T. Hasegawa, G. Hill, A. Hillenbrand, M. Hoek, Y. Holler, I. Hristova, G. Iarygin, Y. Imazu, A. Ivanilov, A. Izotov, H.E. Jackson, A. Jgoun, S. Joosten, R. Kaiser, T. Keri, E. Kinney, A. Kisselev, M. Kopytin, V. Korotkov, V. Kozlov, P. Kravchenko, V.G. Krivokhijine, L. Lagamba, R. Lamb, L. Lapikas, I. Lehmann, P. Lenisa, L.A. Linden-Levy, W. Lorenzon, S. Lu, X. Lu, B.-Q. Ma, D. Mahon, B. Maiheu, N.C.R. Makins, Y. Mao, B. Marianski, H. Marukyan, C.A. Miller, Y. Miyachi, V. Muccifora, M. Murray, A. Mussgiller, A. Nagaitsev, E. Nappi, Y. Naryshkin, A. Nass, M. Negodaev, W.-D. Nowak, A. Osborne, PAPPALARDO L., R. Perez-Benito, N. Pickert, M. Raithe, P.E. Reimer, A. Reischl, A.R. Reolon, C. Riedl, K. Rith, S.E. Rock, G. Rosner, A. Rostomyan, L. Rubacek, J. Rubin, A.L. Ruiz, D. Ryckbosch, Y. Salomatin, I. Sanjiev, A. Schäfer, G. Schnell, K.P. Schuler, B. Seitz, C. Shearer, T.-A. Shibata, V. Shutov, M. Stancari, M. Statera, E. Steffens, J.J.M. Steijger, H. Stenzel, J. Stewart, F. Stinzing, P. Tait, S. Taroian, A. Terkulov, A. Trzcinski, M. Tytgat, A. Vandenbroucke, P.B. van der Nat, G. van der Steenhoven, Y. Van Haarlem, C. Van Hulse, M. Varanda, D. Veretennikov, V. Vikhrov, I. Vilardi, C. Vogel, S. Wang, S. Yaschenko, H. Ye, Z. Ye, S. Yen, W. Yu, D. Zeiler, B. Zihlmann and P. Zupranski (2008). Evidence for a transverse single-spin asymmetry in leptonproduction of $\pi^+\pi^-$ pairs. JOURNAL OF HIGH ENERGY PHYSICS, vol. 06; p. 017-1-017-19, ISSN: 1126-6708, doi: 10.1088/1126-6708/2008/06/017
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6 - Personnel of the Research Unit

6.1 - Research Unit Personnel

Personnel of the Institution of the Associated Investigator

n°	Surname	Name	Dipartimento/Istituto/ Divisione/Settore	Degree	Typology	Months/ man	Cost
1.	LENISA	Paolo	FISICA	Ricercatore confermato	Tempo Indeterminato	12	80.001
2.	CIULLO	Giuseppe	FISICA	Ricercatore confermato	Tempo Indeterminato	12	0
3.	STATERA	Marco	FISICA	Posizione economica C1	Tempo Indeterminato	12	0
	TOTAL					36	80.001

Other Universities Personnel

n°	Surname	Name	Institution	Dipartimento/Istituto/ Divisione/Settore	Degree	Typology	Months/ man	Cost
	TOTAL						0	0

Other Organisations Personnel

n°	Surname	Name	Institution	Dipartimento/Istituto/ Divisione/Settore	Degree	Typology	Months/ man	Cost
	TOTAL						0	0

6.2 - Personnel - Paid with other funds and occasionally used in the Research Project

n°	Surname	Name	University	Department/Institute	Degree	Months/ man
	TOTAL					0

6.3 - Personnel to be hired

n°	Degree	Typology	Months/ man	Cost
TOTAL			0	0

6.4 - Young Researchers contracts (C.1) and/or International Well Know Researchers contracts (C.2) to be used in this Research Project

n°	Degree	Typology	Months/ man	Cost
1.	ricercatore	Contratto almeno triennale per giovane ricercatore	44	180.000
TOTAL			44	180.000

7 - Total Months/man dedicated to this Program

	Number	Months/ man	Cost
Non Fixed-term personnel (A.1.1)	3	36	80.001
Fixed-term personnel	0	0	0
Non dependent personnel costs	0	0	0
Young Researchers contracts	1	44	180.000
International Well Know Researchers contracts	0	0	0

8 - Description of equipments for this Research Program

n°	Year of acquisition	Description (Italian)	Description (English)	Estimated value	Percentage of use for the proposed activities
1.	2010	testa fredda (crio-pompa)	cold-head (Cryo-pump)	7500	30%
2.	2010	lettore multi-gauge	multi-gauge reader	1800	50%
3.	2010	Alimentatore per dissociatore a RF	power supply for FR dissociator	10000	50%
4.	2010	Interlock PLC	PLC Interlock	2500	100%
5.	2011	gate-valve CF da 40 mm	40mm CF gate-valve	5000	30%

9 - Total cost of the Research Unit Program

Cost item	Cost	Description (Italian)
Personnel Costs (A.1.1)	80.001	Costo stipendiale del Prof. Paolo Lenisa e del Prof. Giuseppe Ciullo normalizzato ai mesi impegnati nel progetto
Personnel Costs (A.1.2)	0	
Non dependent personnel costs (A.2)	0	
General costs	156.001	Spese generali direttamente imputabili all'attività di ricerca (obbligatoriamente nella misura forfettizzata del 60% del costo del personale di cui alle voci A e C)
At least Three-year contracts (young-researchers) and International Well-Known researchers	180.000	Spese per 1 contratto quadriennale per giovani ricercatori
Well-known specialists costs	0	
Equipments costs	12.168	Testa fredda (pompa criogenica); lettore multi-gauge; gate-valve CF da 40mm; alimentatore per dissociatore a radiofrequenza; interlock PLC.
Travels & Subsistence cost	18.500	Missioni all'estero per collaborazione scientifica, installazione apparato e turni di misura
Consulting costs		

Other costs		
TOTAL	446.670	

10 - Incidence on the total cost of the Program

Insert the percentage 69%

11 - Financial overview of the Research Unit

	Grant requested	Own funds	TOTAL
Research activities cost	186.669	80.001	266.670
At least Three-years contracts cost (young researchers)	180.000		180.000
Contracts cost (well-known specialists)	0		0
Total cost of the Program	366.669	80.001	446.670

12 - English language knowledge

I certify that I have a good knowledge of English language: YES

13 - Availability of own funds is confirmed

Availability of own funds is confirmed : YES

14 - Declaration of acquiring of the PhD title

PhD in Fisica
Institution Università degli Studi di FERRARA
Date 26/03/2008

15 - Institution certification

Institution Università degli Studi di
FERRARA
SI

16 - Project activities location

I certify that I will complete my activity at the institution indicated in point 15: YES

Si ricorda che il cofinanziamento a carico del proponente deve essere pari al 30% del costo complessivo della proposta progettuale, detratti i costi dei contratti triennali per giovani ricercatori e per ricercatori di chiara fama, che sono finanziati al 100%.

I dati contenuti nella domanda di finanziamento sono trattati esclusivamente per lo svolgimento delle funzioni istituzionali del MIUR. Incaricato del trattamento è il CINECA- Dipartimento Servizi per il MIUR. La consultazione è altresì riservata al MIUR - D.G. della Ricerca -- Ufficio IV, alla Commissione FIRB e ai referee scientifici. Il MIUR potrà anche procedere alla diffusione dei principali dati economici e scientifici relativi ai progetti finanziati. Responsabile del procedimento è il dirigente dell'ufficio IV della D.G. della Ricerca del MIUR.

Firma

Data..... (inserita dal sistema al termine della redazione della domanda)