



EUROPEAN COMMISSION
RESEARCH AND INNOVATION DG

Periodic Report

Project No: 283286

Project Acronym: HadronPhysics3

Project Full Name: Study of Strongly Interacting Matter

Periodic Report

Period covered: from 01/01/2012 to 30/06/2013

Start date of project: 01/01/2012

Project coordinator name:

Dr. Carlo Guaraldo

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Date of submission (SESAM):

Project coordinator organisation name:

ISTITUTO NAZIONALE DI FISICA NUCLEARE

Periodic Report

PROJECT PERIODIC REPORT

Grant Agreement number:	283286
Project acronym:	HadronPhysics3
Project title:	Study of Strongly Interacting Matter
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Period number:	1st
Period covered - start date:	01/01/2012
Period covered - end date:	30/06/2013
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Declaration by the scientific representative of the project coordinator (1)

I, Dr. Carlo Guaraldo ISTITUTO NAZIONALE DI FISICA NUCLEARE , as scientific representative of the coordinator of the project HadronPhysics3 and in line with the obligations as stated in Article II.2.3 of the Grant Agreement declare that:

The project has fully achieved its objectives and technical goals for the period.

The attached periodic report represents an accurate description of the work carried out in this project for this reporting period.

The public website is up to date.

To my best knowledge, the financial statements which are being submitted as part of this report are in line with the actual work carried out and are consistent with the report on the resources used for the project (section 6) and if applicable with the certificate on financial statement.

All beneficiaries, in particular non-profit public bodies, secondary and higher education establishments, research organisations and SMEs, have declared to have verified their legal status. Any changes have been reported under section 5 (Project Management) in accordance with Article II.3.f of the Grant Agreement.

Name	Dr. Carlo Guaraldo ISTITUTO NAZIONALE DI FISICA NUCLEARE
Date	

This declaration was visaed electronically by (ECAS user name nguaraca) on

1. Publishable summary

Summary description of project context and objectives

The Project promotes the access to five European Research Infrastructures, and it is structured into nine Networking Activities, plus the Management of the Consortium, and fourteen Joint Research Activities. The Project profits of the success of the previous HadronPhysics project in FP6, the HadronPhysics2 in FP7 and the current HadronPhysics3, which have so much promoted the field by bringing together hadron physicists using different tools (lepton, hadron and ion beams), who previously tended to work separately. The collaboration among theorists and experimentalists is a typical feature of the hadron physics community. HadronPhysics3 originates from the initiative of more than 2.500 scientists active in Universities and Research Organizations. The main objective of this Integrating Activity is to optimize the use and development of the Research Infrastructures existing in Europe working in the field of hadron physics. The Project aims as well at structuring, on European scale, the way Research Infrastructures operate, and at fostering their joint development in terms of capacity and performance. Links with leading non-European laboratories and researchers exist and are contributing to the activities.

The description of the 29 activities can be found in the HadronPhysics3 website:
<http://www.hadronphysics3.eu>

Description of work performed and main results

The description of the work performed in the reporting period and the main results of each activity are reported below.

TRANSNATIONAL ACCESS ACTIVITIES

ECT*

24 User-Projects	208 Users	905 man*days spent at the infrastructure
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MAMI

10 User-Projects	46 Users	1.230 man*days
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GSI

2 User-Projects	28 Users	551 man*days
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COSY

10 User-Projects	131 Users	2.342 man*days
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LNF

24 User-Projects	105 Users	1.945 man*days
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NETWORKING ACTIVITIES

ALL THE NETWORKING ACTIVITIES OF HADRONPHYSICS3 ARE STRONGLY CONNECTED WITH THE RESEARCH INFRASTRUCTURES AND PLAY A FUNDAMENTAL ROLE FOR THEIR IMPROVEMENT.

WP2: TURHIC - Theory of Ultra Relativistic Heavy Ion Collisions

WP2 has as main objectives: the study of the properties of plasma before hadronization; the modification of hard probes passing through the quark-gluon-plasma; the study of initial thermalization.

In the first period, WP2 has introduced, for the first time, in the study of the initial thermalization, the so-called Color Glass Condensate, that has allowed to understand two-body correlations in terms of

initial thermalization.

The workshop “Heavy quarks and quarkonia in thermal Quantum Chromo Dynamics (QCD)” (01-05 April 2013) is focused on the objectives of WP2-TURHIC and WP8-SaporaGravis Heavy flavored probes of deconfined QCD matter.

This workshop is an example of how a Research Infrastructure (RI) can be improved.

Improving the RI ECT* means to contribute to organize and define programs and participants, and coordinate high-level scientific workshops and research initiatives, along the qualified benchmarks of the Centre.

WP3: ENCstudy - Feasibility study for an electron-nucleon collider in Europe

The feasibility of a polarized electron-nucleon collider (ENC) with a center-of-mass energy up to 14 GeV for luminosities exceeding $10^{32} \text{ cm}^{-2}\text{s}^{-1}$ has been studied. The proposed concept utilizes the planned 15 GeV/c High-Energy Storage Ring (HESR) at the future International Facility for Antiproton and Ion Research (FAIR) for protons/deuterons and integrates an additional 3.3 GeV electron ring. A special design of the interaction region (IR) is required to realize back-to-back operation of the HESR storage ring in fixed target mode.

For polarized proton/deuteron beams additional equipment like Siberian snake has to be implemented to preserve the beam's polarization. A corresponding scheme for polarized electrons has been studied. Work has been concentrated on detector studies and experiment simulation of physics channels (“Physics simulation of benchmark channels”) and on the accelerator design including the study of polarization and the interaction region of the two colliding beams (“Electron ring design study”).

The WP3-ENCstudy networking activity has a direct benefit for the improvement of the RI COSY, being related to the new 2 MV electron cooler at COSY. The participation in this network activity was very helpful for the design work for the new electron cooler, which is presently in the commissioning phase at COSY. It will allow to cool the beam up to the maximum COSY energy and will improve the beam emittance for experiments at high energy.

WP4: EPOS - Exciting Physics Of Strong Interactions

EPOS is a large assembly of active hadron physics theoreticians, which operate in four main areas:

- precision calculations in strong interaction physics
- spectrum of QCD
- methods for lattice QCD
- nuclear matter and phases of QCD

Many intriguing results has been obtained in the first period in all project areas.

- 137 papers published (PRL, PRD, PRC, EPJA, EPJC, JHEP, NPA, NPB, ...)
- two dozen papers submitted to peer reviewed journals
- 100 talks at conferences/workshops [submitted to the arXives]
- 2 conferences/workshops (co-) sponsored:
 - “Nuclear Matter and Phases of QCD,” Graz, Austria, May 21-23, 2013
 - “NSTAR 2013,” Peniscola, Spain, May 27-30, 2013.

WP5: MesonNet - Meson Physics in Low-Energy QCD

The Networking Activity WP5-MesonNet can be considered a paradigm of the role expected to be played by a Networking Activity towards the Research Infrastructures (RIs) of an Integrating Activity (IA).

It performs:

- Analysis and coordination of the experimental data collected in different infrastructures, with different techniques and different detectors, linked to the RIs WP12-MAMI (Mainz),

WP15-LNF/DAFNE (Frascati), WP14-COSY (Jülich), WP13-GSI (Darmstadt) and ELSA (Bonn), for research in the field of light mesons production and decays.

The creation of a data base is one of the output. This has been already achieved in the first 18 months, for the study of light meson decays (cfr. Deliverable D5.2).

- Trigger for new experiments.

MesonNet plays a major role in enlarging the original field of research on light mesons by addressing the RIs LNF/DAFNE (Frascati) and MAMI (Mainz) along a new line of research, that of the new physics beyond the Standard Model.

This is done by promoting the measurement of the $(g-2)$ muon anomalous magnetic moment, by exploring the mass limits of the so-called “dark photon”, whose discovery might help in clarifying one of the big mysteries of modern physics, the “dark matter”, which, together with the “dark energy”, constitute the 96% of the mass of our universe.

- Creation of working groups between theorists and experimentalists.

WP6: SPHERE - Strange Particles in Hadronic Environment Research in Europe

The program of SPHERE consists of four activities:

- Physics

- Experiments: hypernuclear experiments planning and analysis and interpretation of experimental results

- Detectors: exchange of know-how to design, to build, to integrate and to operate the new experimental equipments and develop analysis tools.

- Theory: this activity will serve to join efforts of the various theory groups with the common goal to develop theoretical models appropriate for the analysis of hypernuclear production and structure data, including large-scale numerical simulations.

Achievements of WP6:

- Hypernuclei physics:

- Clear evidence has been found for the neutron-rich 6H_Λ nucleus and for the two-nucleon induced weak decay of Λ -hypernuclei by analyzing the data sample collected by the FINUDA experiment.

- First observation of 3H_Λ (and its antinucleus) at ALICE and publication of the first results of the HypHI collaboration (including the GSI and Mainz groups) on 3H_Λ and 4H_Λ .

WP7: FAIRnet - A worldwide research networking activity for experiments on QCD at FAIR.

The network FAIRnet aims to develop:

Joint R&D on software and hardware to satisfy requirements common to PANDA and CBM.

Both experiments will be operated at very high reaction rates (up to 10 MHz) which calls for unprecedented detector performance in terms of readout speed and radiation hardness.

The most important results achieved during the reporting period are the completion of four Technical Design Reports (TDRs) for PANDA (Micro Vertex Detector (MVD), Straw Tube Tracker (STT), Internal Target (IT), Muon Detection System (MTD)), and of four Technical Design Reports (TDRs) for CBM (Silicon Tracking System (STS), Magnet, Project Spectator Detector (SPD), Ring Imaging Cherenkov Detector (RICH)).

Another important achievement is the decision of the R3B Collaboration to choose the FairRoot package as the general framework for their software activity.

WP8: SaporeGravis - Heavy flavoured probes of deconfined QCD matter

WP8 is interested in the interpretation of the LHC results in the sector of heavy flavored observables.

Important results have been obtained in the first period.

For the first time the nuclear modification factor (R_{AA}) of D mesons and J/Psi B-decays have been measured at the LHC. A strong suppression of the D mesons nuclear modification factor in Pb-Pb at 2.76 TeV is observed and the R_{AA} is compatible with that of light hadrons.

The fundamental QCD question about how the heavy quarks interact with the QCD medium formed in heavy ion collisions at the LHC is being addressed. The following main conclusions could be hinted from the present results: i) charm quarks seem to interact with the hot and dense medium formed in heavy ion collisions at LHC energies, ii) less J/Psi R_{AA} suppression with respect to that at RHIC has been observed.

The relevance of the objectives of WP8 and the validity of the results discussed by an audience of qualified participants to the workshop "Heavy quarks and quarkonia in thermal QCD" at ECT* fit perfectly with the definition of improvement of the RI ECT*.

WP9: LEANNIS - Low-energy antikaon-nucleon and -nuclei interaction studies

The central objectives of the proposed networking activity LEANNIS are the definition and coordination of studies on low-energy antikaon nucleon (nucleus) interaction in theory and experiment centered in Europe, but with strong impact on the worldwide strategy in the field.

Achievements of WP9:

a) Kaonic atoms

- Kaonic hydrogen

SIDDHARTA measurement of the kaonic hydrogen X-rays emitted in the transition from the 2p state to the ground state. The up-to-now most accurate results on the observables (energy shift and broadening of the 1s state) were determined.

- Kaonic deuterium

The analysis of the data taken with the deuterium gas was performed as the first ever study of kaonic deuterium X-rays.

- Kaonic helium data (2p state width)

The open question about the strong interaction width of the 2p state of kaonic helium isotopes (helium-3 and helium-4) was solved. It was found that the value of the 2p state width in kaonic helium-4 is much smaller than the results of experiments performed in the 1970's and 1980's.

- A new SIDDHARTA setup on DAFNE, SIDDHARTA-2, characterized by higher target pressure, improved solid angles, improved kaon trigger, improved detector resolution, veto counters, for an overall increase of the signal to background ratio of a factor around 20, was realized.

The setup is ready to be installed, waiting for the time schedule of the machine.

b) Antikaon-nucleus interaction

- HADES at GSI

With HADES at GSI Lambda(1405) was produced via p+p collisions at 3.5 GeV. The charged decay channels of Lambda(1405) in Sigma+ pi-, Sigma- pi+ have been reconstructed for the first time in proton-proton collisions. A total cross section of $\sigma = 9.2 \pm 0.9 \pm 0.7 \mu\text{b}$ was measured.

- AMADEUS

The first part of the AMADEUS programme was started in the middle of 2012.

A pure carbon target was installed within the KLOE detector in August 2012. This target has allowed to investigate the Sigma0 pi0 channel generated by K absorption on 12C. Data were taken in November and December 2012, the data analysis is in progress.

WP10: LatticeQCD - Lattice Quantum Chromodynamics

The activity has multiple tasks:

- Algorithms and machines (in progress)
- Stochastic techniques (advanced studies)
- Renormalization and improvement (in progress)

- Hadron spectrum (advanced studies)
- Hadron structure (in progress)
- Flavor singlet matrix elements (advanced studies)
- Constraining effective field theory (in progress)
- Heavy quark physics (advanced studies)
- Physics beyond the Standard Model (in progress)
- Fundamental symmetries (advanced studies)
- QCD phase diagram (in progress)
- Equation of state (in progress)
- Screening phenomena (in progress)
- Spectral properties (in progress)
- Quantum number fluctuations (advanced studies)
- QCD vacuum (in progress)
- Peer Reviewed Publications:
 - Phys. Rev. Lett. 5
 - Phys. Rev. D 43
 - Phys. Lett. B 9
 - Nucl. Phys. B 10
 - JHEP 21
 - Eur. Phys. J. C 2
 - Rev. Mod. Phys. 1
 - Conf. Proc. 47

JOINT RESEARCH ACTIVITIES

THE JOINT RESEARCH ACTIVITIES (JRAS) SHOW NUMEROUS EXAMPLES OF DIRECT IMPACT ON THE IMPROVEMENT OF THE PERFORMANCE OF AN INFRASTRUCTURE AND CONCRETE FEEDBACK ON THE INFRASTRUCTURE VIA THE TRANSNATIONAL ACCESS.

WP16: ADAMAS - Advanced Diamond Assemblies

The proposed HadronPhysics3 work package ADAMAS focuses on:

- the continuous improvement of quality and post-processing of Diamond-on-Iridium (DoI) materials;
- the design and development of new state of the art detectors with appropriate Radio Frequency (RF) electronics for advanced diamond assemblies.

Diamond on Iridium samples with a size of (25 x 25) mm² have been grown, allowing to enter a new field of single crystal diamond detectors with active areas not accessible up to now.

In the h-drift mode, the performance of recent DOI detectors is approaching the potential of homoepitaxial Chemical Vapor Deposition (CVD)-diamond sensors.

WP17: DNPMag - Internal Magnets for DNP

The final goal of this Work Package is a polarized solid target, which is polarized by continuous Dynamic Nuclear Polarization (DNP) and operates in a 4pi-detection system.

Achievements of WP17:

DNPMag for small size targets has started successfully:

- First test solenoids: successfully wound in Mainz and Bonn
- Test facility has been set up for first cold tests
- Low-T refrigerator is in progress

DNPMag for large size targets:

- Design studies for a long (1m) thin (\varnothing 150 mm) solenoid has started.

WP18: FPD - Frontier Photon Detectors

This JRA aims to advance in the R&D studies of novel photon detectors based on Multi-Wall Carbon Nano Tubes (MWCNT) photocathodes coupled to Micro Pattern Gaseous Detectors (MPGD) devices by entirely new approaches for MWCNT fabrication and surface treatment, likely leading to a modulable photodetection bandwidth, and innovative solutions in the MPGD design.

The carbon nanotubes spray technique has been setup, with the computer controlled deposition parameters, as well as the carbon powder dispersion procedure and the solution preparation. A sonicator spray gun has allowed to apply the sonication process directly during the film spray deposition step in order to obtain a better dispersion.

The complete characterization of thick Gas Electron Multiplier (GEM)-based photon detectors has been completed by the construction, read-out and test of small-size detectors. No stopping point has been detected and the detector principle is now fully validated.

WP19: FuturePID - Future Particle Identification Techniques

In this work package Transition Radiation Detectors (TRDs) and Resistive Plate Chambers (RPCs), shall be optimized using novel materials and techniques.

The limits of free-running, un-triggered readout electronics architecture for interactions rates of the order of several MHz, will be explored.

Significant advances were made towards the development of a low-mass large-area TRD, suitable for the high counting rates up to 100 kHz/cm². Several prototypes based on Single Multi-Wire Proportional Chambers (MWPC) coupled with a small drift region with high granularity (typically 1 cm² pad area) were constructed and tested in beams and in the laboratory. A position resolution across the pads of 330 μ m and of 1.3 mm along the pads was obtained.

The latest version of the RPC developed within the scope of the WP19 activity was demonstrated to have a superb rate performance with a timing resolution of 50 ps for a particle flux of up to 8 kHz/cm² and still better than 70 ps for a particle flux of up to 100 kHz/cm².

WP20: FutureJet - Cryogenic jets of nano-to micrometer-sized particles for hadron physics

The objective of this JRA is to perform significant further developments on the science and technology of cryogenically cooled beam sources with applications in various research fields.

New LAVAL nozzles for cluster jet targets with small diameters, i.e. below 50 μ m, can now be produced.

The use of a nozzle tilting system allowed for the preparation of cluster beams with unprecedented thicknesses. Hydrogen cluster beams with a density of above 2×10^{15} atoms/cm² at a distance of more than 2 meters behind the nozzle are now produced routinely.

Nozzle production for pellet beams with a wide range of diameters of 5-50 μ m has been developed.

The work on the pellet target was focused on the development of an optical tracking system based on lasers and fast linear Charged-Coupled Device (CCD)-cameras.

WP21: CherenkovImaging - Development of high rate compact Cherenkov imaging technology

This JRA concentrates on the development of particle identification solutions using the Detection of Internally Reflected Cherenkov Light (DIRC) principle.

The two main challenges addressed in WP21 are:

- the photon detection system, which hitherto does not yet fulfill all specifications for the coming hadron physics experiments and
- the integration of an advanced prototype detector into a running physics experiment,

WASA at COSY.

Regarding the first challenge, the initial aim was to build a device based on a Venetian blind type of dynode structure made from diamond coated Molybdenum.

The manufacture of these structures from Molybdenum was found unsatisfactory and was replaced by Si/SiO₂ structures.

Regarding the second challenge, the WASA collaboration decided to change the running schedule of their planned experiments, which means that the installation of the disc DIRC detector will most likely not go ahead as scheduled.

WP22: LYSO Fiber - Frontier scintillation detectors based on inorganic fibers

Scintillation detectors based on inorganic materials are still one of the most widely applied instrumentation techniques in physics. In particular in the field of hadron physics they will provide significantly higher light yield, an efficient interaction with electromagnetic probes due to the content of high-Z elements, a wider range of emission wavelength to adapt to the appropriate photo sensors and remain more resistant to radiation damage for long term operation.

This JRA concentrates in the production of thin LYSO:Ce fibers.

The final goal has to be the industrial production of large quantities and, therefore, the development and test of more efficient growth capabilities.

Achievements of WP22:

- Production of high-quality LYSO:Ce fibers

The quality of LYSO:Ce fibers has been improved, and as a first major step, undoped fibers have been grown up to a total length of 80 cm with large regions free of cracks.

- Production of high-quality LuAG:Ce fibers

The quality of LuAG:Ce fibers has been drastically improved with respect to structural defects and light attenuation within the fiber as a result of fine-tuning of the growing technology.

WP23: GPDex - Generalized Parton Distributions

Work package objectives:

the first aim of this JRA is to contribute to the R&D of a series of new detectors to be installed at:

- the COMPASS facility:
Recoil detector "CAMERA"
- the CLAS12 facility:
Cylindrical tracker (CT)
Central neutron detector (CND)
Forward tagger (FT).

Achievements of WP23:

- For COMPASS, the CAMERA recoil detector has been built and used to take data in autumn 2012.

- For the new cylindrical tracker (CT), a full size large tile has been tested.

- For the recoil neutron detector (CND), the design has been frozen and a prototype has been built.

- For the forward tagger (FT), the choice of the detector key-elements has been made. Full geometry entered in GEANT for simulations.

- For the theory part of the project, publications have been produced.

WP24: JointGEM - Ultra-light and ultra-large tracking systems based on Gas Electron Multiplier (GEM) technology.

Aims of WP24:

- "Active target" TPC (Time Projection Chamber)

- Large area GEM foils and support structures
- Large-size readout structures, ASIC and FEE optimization

Achievements of WP24:

- Production of GEM-TPC prototypes for helium and hydrogen with 10x10 cm² active area and 15 cm drift gap.
- First successful tests of the helium GEM-TPC at piM1 beam facility at Paul Scherrer Institute (PSI) with a standard gas mixture and pure helium gas.
- Design and production of large-area GEM foils for C-GEMs (Cylindrical GEM-based detector) at LNF-INFN and for the ALICE IROC prototype, size 500 x 470 mm².
- A GEMEX (Exploder for Gas-Electron-Multiplier) applications readout system has been developed.
- First application of a large-area GEM-TPC with full readout in a physics experiment.

WP25: PolAntiP - Polarized Antiprotons

The present JRA aims at studying the feasibility for the production of polarized antiprotons.

This means to pursue the following objectives:

- I) Investigating the possibility of polarizing a stored beam by spin-flip as an alternative method to spin filtering
- II) Performing polarization buildup studies of protons with transverse polarization.
- III) Performing longitudinal polarization studies with protons at COSY.

Achievements of WP25:

- Polarization buildup studies of protons with transverse polarization, were performed at COSY.

The PolAntiP (WP25) activity requires very stable beam conditions and spin manipulations possibilities. Big effort had to be put into the machine development, turning out in a better understanding of the machine and more stable and precise beam for all experiments, what increased the performance. The complete experimental setup, consisting of low-beta section, polarized hydrogen atomic beam source, Breit-Rabi target polarimeter, target chamber, including holding field coils, and storage cell has been installed and commissioned at COSY. A first measurement of transverse spin filtering at COSY, yielding the spin-dependent cross section σ_1 in pp scattering was performed.

- Longitudinal polarization studies with protons are as well planned: a Siberian snake has been designed and is presently built by Cryogenic Ltd, London, UK. It will as well increase the possibilities of experiments devoted to spin physics. There is also an impact on a fundamental experiment of the facility FAIR-PAX.

WP26: ULISINT - Integration of ultra-light silicon tracking and vertex detection systems

The JRA ULISINT covers three fields of large-area tracking and vertex detectors, each of them backbones of the upcoming CBM and PANDA detectors at FAIR:

- a thin fast micro-strip tracking detector system for large area coverage
- a thin fast pixel hybrid detector system for tracking in very high particle densities
- an ultra-thin monolithic pixel detector system with very high spatial resolution for decay vertex identification.

Achievements of WP26:

- Technologies and procedures towards the integration of the three types of detectors into full systems have been explored.
- An assembly technology and procedures for the integration of sensor and read-out components into a low-mass silicon microstrip tracking detector module have been identified.
- Power regulators of the hybrid pixel detector system have been designed. Prototypes of low mass cables have been tested.
- The successful in-beam validation of the prototype of monolithic pixel detector system of the

CBM-Micro Vertex Detector (MVD) (first station downstream of the target) highlights the so far achieved results.

WP27: Di-JETCAL - A Di-Jet Electromagnetic Calorimeter for Jet Quenching Study

In the ALICE spectrometer, in order to expand the physics capabilities of EMCal by enabling back-to-back correlation measurements, a large acceptance Electromagnetic Calorimeter positioned opposite to and down EMCal (DCal) is under study.

Thus the aim of the proposed JRA is to perform an extensive study of jet quenching in heavy ion collisions.

Achievements of WP27:

- A High Level Trigger (HLT) for the electromagnetic calorimeter has been developed and tested at low luminosity LHC runs.
- Significant improvements has been done in understanding background subtraction. The naive expectation that background subtraction methods are enough for phenomenological jet studies to extract medium characteristics without considering the background, becomes strongly weakened.
- The first measurement of the inclusive differential jet cross section in pp collisions at square root $s = 2.76$ TeV, has been reported by ALICE Collaboration.
- A new description of the jet quenching phenomenon observed in nuclear collisions at high energies, in which coherent parton branching plays a central role, has been proposed.

WP28: SiliconMultiplier - Matrix Geiger-Mode Avalanche Micro-Pixel Photo Diodes

The aim of this JRA is to perform R&D for prototypes of advanced particle detectors for hadron physics exploiting the strengths of the new photon sensor SiPM and pushing against the present deficiencies. The important tasks of investigation with the SiPM sensor are the following:

- Test of new SiPMs, integrated in arrays that are compatible with the demands of position sensitive detectors.
- Development of associated electronics at the front-end: preamplifiers, ASICs with TDC and ADC capability.
- Assembly and installation in detector systems working in magnetic field.

Achievements of WP28:

- The prototype of a Kaon Trigger/Tracker Detector for DAFNE made with scintillating fibers read-out via SiPMs has been successfully tested in a hadron beams. With this experience the new central tracker for SIDDHARTA-2 and AMADEUS is ready to be built.
- The Shashlik calorimeter development using the highly linear Zecotek sensors (deep microwell type) is completed. Modules are under construction for COMPASS II.
- Using the very fast scintillator from Eljen (EJ228), together with the Philips Digital SiPMs, the benchmark of 100 ps in time resolution has been reached in the laboratory.

WP29: 3D-Mom - Three-dimensional momentum structure of hadrons

This joint research activity pursues three main objectives, involving both experimentalists and theoreticians:

- design studies, test measurements and prototype construction for the CLAS12 RICH detector;
- basic studies of fundamental field theoretical properties of Transverse Momentum Dependent (TMDs) distributions within the framework of QCD and model calculations of TMDs;
- measurement of spin-dependent and -independent azimuthal modulations at various facilities and the global analysis of all available data for the extraction of TMDs.

Achievements of WP29:

- Detailed GEANT4 Monte Carlo simulations of the CLAS12 RICH detector, optical characterisation studies, construction of a large size prototype of modular structure, 5 week test measurements at the CERN T9 beam for design and performance of the various different

components, were performed.

- Valuable new insights into fundamental properties of TMDs were obtained from QCD studies, model calculations and phenomenological considerations.

PROJECT MANAGEMENT

List of milestones:

- Signature of the Grant Agreement n. 283286, project title “HadronPhysics3”, by the Coordinator: 15 December 2011
- Signature of the Grant Agreement by the European Commission: 16 December 2011
- Starting date of the project: 1 January 2012
- Duration of the project: 36 months from the starting date
- Pre-financing from the European Commission: 9 February 2012
- Request for amendment n. 1 to Grant Agreement n. 283286: 20 May 2013
- Acceptance of the Amendment n. 1 to Grant Agreement: 10 July 2013
- Deadline for submitting the First Periodic Report: 30 August 2013

The actions which have been done by the project management in the first reporting period are: organizational activities and actions undertaken to disseminate, promote and exploit the knowledge connected with the project.

1. Organizational activities of the management:

- promotional activities towards the spokespersons of the work packages (activity leaders), to further the implementation of the work packages, to monitor their progress, to monitor the expenditures according to the implementation plan, to foster the flow of information within the project;

- contacts with the persons in charge for administrative and scientific aspects for each beneficiary;

- contacts with the Commission - Project Officer, Financial Officer, Legal Offices, others - for discussions related the management of the project;

- implementation of the managerial bodies which constitute the managerial structure of the project:

- Management Board
- Governing Board
- Dissemination Board
- Organization of periodical meetings of the managerial body;

- preparation of the first Periodic Report;

- preparation of the amendment n. 1 to the Grant Agreement

- presentations to NuPECC.

In the following table, the presentations of the HadronPhysics3 project to the Nuclear Physics European Collaboration Committee (NuPECC) in the first period, are reported.

March 9-10, 2012 | 73rd NuPECC Meeting | HadronPhysics3 Updates | Milano, Italy

October 5-6, 2012 | 75th NuPECC Meeting | HadronPhysics3 Updates | Sevilla, Spain

March 15-16, 2013 | 76th NuPECC Meeting | HadronPhysics3 Updates | Jülich, Germany

- contacts with the community:

In the following list the contacts with the community are reported:

23-24 March 2012 | CERN Management | Role of CERN in HadronPhysics3 | CERN,

Switzerland

12-14 April 2012 | Organizing Committee MESON 2012 | Definition of the HadronPhysics3 sponsorship | Cracow, Poland

23 April 2012 | INFN Sezione di Milano | Discussion about European programs of INFN Sezione di Milano | Milano, Italy

20 May 2012 | LEANNIS meeting | Presentation of HadronPhysics3 and European programs | Prague, Czech Republic

30 May 2012 | Jagiellonian University Management | Discussion about Jagiellonian University participation in HadronPhysics3 | Cracow, Poland

17-20 June 2012 | INFN Management | The role of HadronPhysics3 in INFN programs | Torino, Italy

2 July 2012 | SMI Management | Discussion about the participation of SMI in HadronPhysics3 | Vienna, Austria

2 September 2012 | INFN Sezione di Catania | Discussion about the participation of Sezione di Catania in HadronPhysics3 | Catania, Italy

13 September 2012 | CERN Management | Participation of CERN in HadronPhysics3 | CERN, Switzerland

14 October 2012 | ECT* Management | Role of ECT* in HadronPhysics3 | Trento, Italy

9-11 May 2013 | Organizing Committee MESON 2014 | Definition of the role of the HadronPhysics3 thematic in the MESON 2014 program | Cracow, Poland

21-22 June 2013 ECT* | Joint Finance Review Committee | ECT* within the HadronPhysics projects | Trento, Italy

- co-sponsorship of conferences and workshops

Expected final results and potential impacts

1. Strategic impact

1.1 STRUCTURING THE FIELD

Hadron physics (HP) is an emerging research field adjoining the more traditional fields of nuclear physics (NP) and high energy physics (HEP). It addresses questions of fundamental importance such as the structure and interactions of relativistic bound states (protons, pions, ...) and new phases of matter (quark-gluon plasma) created in relativistic heavy ion collisions. All these phenomena are thought to be governed by the theory of Quantum Chromo Dynamics (QCD), which is a part of the Standard Model of particle physics and has novel and poorly understood properties.

Significant resources are devoted, in Europe as well as internationally, on experimental facilities relevant for hadron physics. From a purely scientific point of view, the boundaries between research fields are often irrelevant. Thus the LHC facility will serve both the HEP and HP communities, while the FAIR facility is of interest for NP and HP. The community of hadron physicists comprises both nuclear and particle physicists. In the US they have formed the American Physical Society (APS) "Topical Group on Hadron Physics", which strives to enhance the communication with the Divisions of Particle and Nuclear Physics of the APS. There is no analogous grouping of all European hadron physicists. However, the first HadronPhysics project in FP6 and the HadronPhysics2 project in FP7 have had an important role in structuring the field. The HadronPhysics3 project has further increased the cohesion and the synergy between NP and HEP.

The three HadronPhysics projects have brought together European hadron physicists using different tools (lepton, hadron and ion beams), who previously tended to work separately. This is bringing both scientific and financial benefits. HadronPhysics3 builds on these achievements in joining

practically all European hadron physicists. Many of the Networks and JRAs also involve groups from outside Europe, in particular from China, Japan and USA.

Moreover, HadronPhysics3 intends to raise the profile of hadron physics by a number of high-visibility events, which cover all its subprojects.

The European Centre ECT* in Trento plays an important and unique role in hadron physics through workshops, training programs, research projects and by promoting the cooperation between theoreticians and experimentalists. HadronPhysics projects and ECT* identified common fields of cooperation, which were considered as beneficial and in the interest of both the goals of HadronPhysics and the mission of ECT*:

- Joint HadronPhysics-ECT* Workshops;
- Joint assistant professor level positions in hadron physics.

Since HadronPhysics2, ECT* participates directly in HadronPhysics projects as a provider of transnational access, and thus as beneficiary of the Grant Agreement.

1.2 EXPECTED IMPACT ON EXISTING RESEARCH INFRASTRUCTURES

The HadronPhysics3 project will improve the performance of the European Research Infrastructures, and will help to maintain their leading role in hadron physics worldwide. The Joint Research and Networking activities will provide advanced instrumentation, concentrate high-level expertise at the Research Infrastructures involved in the project, and strengthen their scientific cooperation with the European Universities. Scientists from Europe and outside will participate in fore-front research performed at the accelerator facilities MAMI in Mainz (Germany), LNF in Frascati (Italy), COSY in Jülich (Germany), GSI in Darmstadt (Germany). The European Centre for Theoretical Studies in Nuclear Physics and Related Areas ECT* in Trento (Italy) hosts numerous workshops and lecture weeks, and became a central place for scientific discussions and for training and supervision of students and post-docs.

1.3 EXPECTED IMPACT ON FUTURE RESEARCH INFRASTRUCTURES

The HadronPhysics3 project puts a special emphasis on the implementation of the international Facility for Antiproton and Ion Research (FAIR) in Darmstadt (Germany). Several Joint Research and Networking activities are devoted to the development of this experimental and theoretical infrastructure for hadron physics research. This future European Research Infrastructure will be the major facility for hadron and nuclear physics worldwide, and will guarantee the European leadership in these fields of fundamental research for the next generation of scientists.

1.4 EXPECTED IMPACT ON THE DEVELOPMENT OF ADVANCED THEORETICAL METHODS

Another important field of research within the HadronPhysics3 project is the development of advanced theoretical methods aiming at the fundamental understanding of the strong force, and of its phenomenological consequences for the hadronic world we live in. The challenge is to describe complex strongly interacting many-body systems, starting from the structure of hadrons up to the dynamics of heavy ion collisions. The theoretical investigations are crucial for the interpretation of measured data, and set the stage for key experiments at the research infrastructures. The development of modern theoretical tools for hadron physics requires large scale collaborations, and high performance computing competence. As a consequence, these activities will provide new insight in the nature of the strong force, and a highly innovative computing technology for the European research infrastructures.

1.5 EXPECTED IMPACT ON NEW OPPORTUNITIES FOR SYNERGIES

The Joint Research, Networking, and Transnational Access Activities within the HadronPhysics3

project foster the worldwide cooperation between leading scientists which is a basic prerequisite for the successful realization of the technical developments and the theoretical studies. In many cases the European funding via the HadronPhysics3 project initiates the collaborative efforts, and, hence, opens new opportunities for synergies due to a combined and efficient use of intellectual and technical resources. The HadronPhysics3 project in particular strengthens the mutual interaction of experimentalists and theorists in Europe. Their collaboration within the Joint Activities and Networks leads to a direct exchange of information. Theoretical models are being developed and used as input for feasibility studies of planned experiments, and the joint discussion on the quantitative interpretation of new experimental observations triggers new ideas needed for a deeper understanding of the underlying physics.

1.6 NECESSARY STEPS FOR EXTREME CHALLENGES: SPECIFIC AREAS OF TECHNOLOGICAL DEVELOPMENT

The scientific progress in hadron physics requires novel experimental approaches based on innovative technologies. Future experiments pose extreme challenges to the performance of the involved instrumentation which has to be operated, for example, at huge data rates in harsh radiation environments. Consequently, the technical developments within the HadronPhysics3 project concentrate on radiation hard, highly granulated and fast detectors with very low material budget, on fast and robust readout electronics, and on high speed data processing and acquisition systems. This includes the development of fast algorithms and software solutions for complex simulations, real-time pattern recognition and event reconstruction, and offline data analysis.

1.7 GENUINE INFLUENCE AND FALL-OUT ON APPLICATIONS

The results of the R&D activities will provide a huge potential for application in medical diagnostics and treatment, information technology, safety technology, space research, biology, and material science. The involvement of European industrial partners facilitates the direct transfer of know-how from basic research to society.

1.8 EXPECTED IMPACT ON NATIONAL ACTIVITIES

The HadronPhysics3 project has been proven to be extremely supportive to national research activities. The fact that institutions receive European funding is highly appreciated by their national funding agencies, and serves as proof for excellence and competitiveness on an international level. Consequently, in many cases the corresponding research activities have been and will be additionally supported by national funds.

1.9 EXPECTED IMPACT ON INTERNATIONAL ACTIVITIES

The HadronPhysics3 project substantially increases both the European impact on and the European benefit from international research infrastructures. The developments and achievements of European groups performed within the Joint Research and Networking activities and contributed to experiments at accelerator facilities outside Europe, significantly enhance the influence and the relevance of the European research groups for example at JLab and RHIC in USA, at J-PARC and SPRING8 in Japan, and at BESIII in China.

1.10 SOCIETAL IMPACT: EDUCATION OF YOUNG RESEARCHERS

A very elementary aspect of the HadronPhysics3 project is to pave the road for a scientific career of young researchers in Europe. A substantial part of the requested funds is spent on postdoc positions for young scientists who have the primary responsibility for running and exploiting the future facilities. In this sense this initiative also helps to stop the brain drain from Europe to overseas.

1.11 SOCIETAL IMPACT: PARTNERSHIP BETWEEN NON-EUROPEAN AND EUROPEAN

INSTITUTES ON A LARGE SCALE

The Joint Research and Networking activities within the HadronPhysics3 project comprise more than 2500 scientists from about 170 institutions. Overall 36 countries participate in the project: Member and Associated States of the EU and, moreover, Belarus, Russia, Ukraine, China, India, South Africa. The project involves as well institutions from Japan, Korea and United States. In conclusion, the HadronPhysics projects have become the major instrument for structuring the European hadron physics community, and helps to initiate the partnership between non-European institutes and European Research Infrastructures on a larger scale.

2. Plan for the use and dissemination of foreground

The main objectives of the HadronPhysics3 project for the use and dissemination of the knowledge derived from the project are:

- to raise the profile of hadron physics;
- to achieve visibility for the project and its findings across Europe and worldwide, both within and outside the scientific community;
- to promote the awareness of science as “part of the fabric of society”;
- to recruit and encourage the next generation of scientists.

2.1. ACTIONS UNDERTAKEN TO DISSEMINATE, PROMOTE AND EXPLOIT THE KNOWLEDGE CONNECTED TO AND DERIVED FROM THE PROJECT:

- Publications in international scientific journals
- Presentations in international conferences and workshops
- Presentations of the project in restricted and public seminars.
- Co-sponsorship of international conferences and workshops covering subjects related to the scientific objectives of the project. The posters of these conferences contain the project logo. Organizing committees, coordination of sessions, invited speakers, include persons working in the activities of the project.

In the following table, the co-sponsorships of HadronPhysics3 to international conferences and workshops are listed.

16-20 April 2012 | ALICE-week @LNF | Workshop on the JRA activity WP27-Di-JETCAL "A Di-Jet Electromagnetic Calorimeter for Jet Quenching Study" | LNF, Italy

31 May-5 June 2012 | Meson 2012 | International Workshop on “Meson Production, Properties and Interactions” | Cracow, Poland

15 June 2012 | WP2-TURHIC | Workshop on the Network activity “Theory of Ultrarelativistic Heavy Ions Collisions” | Nantes, France

20-22 June 2012 | QF2012 | Workshop on “Open Problems in Quantum Mechanics” | LNF, Italy

6-10 August 2012 | GGSWBS 2012 | Georgian-German School and Workshop in Basic Science | Tbilisi, Georgia

10-14 September 2012 | WP7-FAIRnet | Workshop on the Network activity “A worldwide research networking activity on QCD at FAIR” | Paris, France

23-28 September 2012 | Channeling 2012 | Workshop on “Charged and neutral particles channeling phenomena” | Alghero, Italy

15 October 2012 | Incontri di Fisica 2012 | Dissemination of HadronPhysics3 contents to high school teachers | LNF, Italy

16-19 October 2012 | Dark forces at accelerators | Workshop on “Experimental searches on new gauge bosons and their connections with dark matter” | LNF, Italy

10-15 June 2013 | LEAP 2013 | International conference on “Low Energy Antiproton Physics” |

Uppsala, Sweden

29 September - 6 October, 2013 | NUFRA2013 | Fourth International Conference on Nuclear Fragmentation | Kemer (Antalya), Turkey

- Topics popularized in scientific magazines for the public-at-large.
Examples of magazines: La Scienza in Italy, Pour la Science in France, Spektrum der Wissenschaft in Germany.

- Actions performed within the individual organizations to publicize research activities and its recent achievements and the knowledge derived from the project.

We give, as an example, some of the activities organized for public by INFN.

- Advertisement in INFN web-site of the HP3 project and related news.

- Week of scientific and technological culture - Open Day. Sponsored by the Italian Ministry of University and Scientific Research, with the aim to foster a capillary diffusion of a solid scientific and technological culture.

Open day: April 22, 2013 (2014 tbd)

"Notte dei Ricercatori: last Friday of September (September 27, 2013)

- Meetings of physics, with high school-teachers to upgrade their knowledge level through information on the newest achievements in modern physics. The meetings also provide a chance to discuss with television and newspaper journalists.

October 9-11, 2013

October 8-10, 2014

- Periodical guided visits of LNF for schools (not only Italian) and wider public, in which thousands of participants get in contact with researchers and their activities. In 2013, these are the figures of the participation: 4000 visitors, of which 2700 students, 270 teachers, 1000 general public, 13 institutes from abroad.

All over the year, particularly from January to June

- Promotional activities to attract students into research, including summer and winter internships for selected students.

Winter Stages: from January to May - 9 days

International Masterclass in English: February/March - 5 days (February 4-8, 2013)

(February 10-14, 2014)

IPPOG Masterclass: March - 5 days (February 25 - 1 March 1, 2013) (March 10-14, 2014)

Summer Stages: June - 10 days (June 10-21, 2013) (June 16-28, 2014)

- Public seminars, held in libraries, schools, theatres, etc., by LNF researchers, in which various themes related to science and its role in modern society are discussed.

All over the year. On request by Italian schools and Libraries.

Seminars are also organized inside LNF.

- The Oriented Science, an activity organized in collaboration with other Research Institutes and Universities in the Roman area, in which seminars, debates and discussions, accompanied by guided tours at LNF, are realized to attract young students to scientific universities.

2.2 THE HADRONPHYSICS3 WEBSITE

The initial homepage explains the nature of the project, then, using a side menu, it is possible to navigate the General Information, extracted from the Description of Work: list of participants, work package description, interconnections between work packages, managerial structure. Each topic becomes a single menu item and contains information, provided in structured language, to explain the contents and activities of the participants.

These fixed menu items are supplemented, when needed, by others, regarding programmed meetings, providing in a reserved area, a personal access to registration forms, agenda, logistic information, and

so on.

The top menu contains, instead, the up-to-date documentation. Along with the official project documents, such as the Grant Agreement with all the Annexes, - among which the Description of Work (Annex I), and the Grant Preparations Forms (GPF) - and the Guide for beneficiaries, there is a section dedicated to past meetings, which includes the list of attendees and the downloadable documents (agenda, slides, etc.), and a section dedicated to the preparation of the periodic reports.

Finally, the top menu contains the Public website, addressed mainly to a non-scientists public. The Public website is made of three blocks.

The first block - Hadron Physics in Europe - aims to introduce the reader to the concept of "hadron". This is done using a simple language, avoiding details. It is explained, in the meantime, the success of this growing research field in between the traditional fields of Nuclear Physics and High Energy Physics, which is attracting in the HadronPhysics projects more than 2500 scientists.

The second block of the Public website - Activities - aims to describe each activity participating to the project. This is done through a series of interviews made to the activity spokespersons on the basis of a set of simple questions.

The scheme of the interviews is the following. The interviewer introduces the spokesperson and then asks:

- Who are you? Can you tell us something about yourself?
- You are leading an activity within the HP3 project – which are the scientifically exciting aspects of your research project?
- Who is participating to your project?
- What do you want to achieve with this activity?
- In which way your activity could be of benefit for the society?
- Why do you think should a young person choose to study science and is there any reason for which should they do so in Europe?
- Would you like to add anything? (this could be both in your native language and in English)

A further step was implemented, to underline the importance that the activities, and in particular the involved scientists, hold in this project. A series of shorts interviews was made to young people that, after achieving their degrees, are approaching the world of work thanks to this project, so that they can tell something about themselves and narrate physics nowadays.

Finally, in order to know not only the Institutions involved in the work packages but as well which is their structure, composition, management, a third block - Links - has been implemented in the Public website. This block allows, through a simple interface, to turn over the sites of the beneficiaries and of the other involved Institutions as if they were pages of a journal, giving, for each of them, a short description of the scientific field in which they operate and as well of their specific roles in the project. In addition to this, a direct link with the Institution is implemented.

Another element in the HadronPhysics3 website is the implementation of a section dedicated to getting to know the HadronPhysics projects, from their dawning until today, recalling the more significant stages of the projects which are, up till now, probably one of the most long-lived ones among the projects financed by the European Union, tangible evidence of its importance in the hadron physics community.

Project public website address:

<http://hadronphysics3.eu/>

2. Core of the report

Project objectives, Work progress and achievements, and project management during the period

The Project Summary Pdf document contains the core of the report.

3. Deliverables and milestones tables

Deliverables (excluding the periodic and final reports)										
Del. no.	Deliverable name	Version	WP no.	Lead beneficiary	Nature	Dissemination level	Delivery date from Annex I (proj month)	Actual / Forecast delivery date	Status	Comments
1	Implementation of the management structure of the project	1.0	1	ISTITUTO NAZIONALE DI FISICA NUCLEARE	Other	PU	3	02/06/2012	Submitted	
2	Creation of the project website	2.0	1	ISTITUTO NAZIONALE DI FISICA NUCLEARE	Other	PU	6	30/06/2012	Submitted	
3	First Periodic Report	1.0	1	ISTITUTO NAZIONALE DI FISICA NUCLEARE	Report	PU	18	30/06/2013	Submitted	
4	Second Periodic Report	0.0	1	ISTITUTO NAZIONALE DI FISICA NUCLEARE	Report	PU	36	31/12/2014	Not submitted	
5	Final Report	0.0	1	ISTITUTO NAZIONALE DI FISICA NUCLEARE	Report	PU	36	31/12/2014	Not submitted	
6	Report on the distribution of the European Union financial contribution between beneficiaries	0.0	1	ISTITUTO NAZIONALE DI FISICA NUCLEARE	Report	PU	36	31/12/2014	Not submitted	
1	Computer programs for interpretation of experimental results	1.0	2	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE	Report	PU	6	30/06/2012	Not submitted	
2	Computer programs for interpretation of experimental results	1.0	2	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE	Report	PU	12	31/12/2012	Not submitted	
3	Computer programs for	1.0	2	CENTRE NAT	Report	PU	18	30/06/2013	Not submitted	

	interpretation of experimental results			IONAL DE LA RECHERCHE SCIENTIFIQUE						
4	Computer programs for interpretation of experimental results	0.0	2	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE	Report	PU	24	31/12/2013	Not submitted	
5	Computer programs for interpretation of experimental results	0.0	2	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE	Report	PU	30	30/06/2014	Not submitted	
6	Computer programs for interpretation of experimental results	0.0	2	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE	Report	PU	33	30/09/2014	Not submitted	
7	Proceedings I Workshop 2013	1.0	2	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE	Other	PU	18	30/06/2012	Not submitted	
8	Proceedings II Workshop 2014	0.0	2	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE	Other	PU	30	30/06/2014	Not submitted	
1	Computer programs for simulation and analysis	0.0	3	JOHANNES GUTENBERG UNIVERSITAET MAINZ	Report	PU	24	31/12/2013	Not submitted	
2	Report on analysis results on benchmark channels	0.0	3	JOHANNES GUTENBERG UNIVERSITAET MAINZ	Report	PU	30	30/06/2014	Not submitted	
3	ENC Physics book	0.0	3	JOHANNES GUTENBERG UNIVERSITAET MAINZ	Report	PU	36	31/12/2014	Not submitted	
4	Report on the lattice configuration of the electron ring	0.0	3	JOHANNES GUTENBERG UNIVERSITAET MAINZ	Report	PU	18	31/12/2013	Not submitted	The lattice configuration needs to be validated in experiment simulations due to its interference with the interaction region.

5	Report on results on beam lifetime and polarization lifetime	0.0	3	JOHANNES GUTENBERG UNIVERSITÄT MAINZ	Report	PU	30	30/06/2014	Not submitted	
6	Conceptual design report for the electron ring and the interaction zone	0.0	3	JOHANNES GUTENBERG UNIVERSITÄT MAINZ	Report	PU	36	31/12/2014	Not submitted	
1	Reports on topical meetings on tasks 1, 2, 3, 4	1.0	4	RHEINISCHE FRIEDRICH-WILHELMS-UNIVERSITÄT BONN	Report	PU	6	31/05/2013	Not submitted	
2	Reports on topical meetings on Tasks 1, 2, 3, 4	1.0	4	RHEINISCHE FRIEDRICH-WILHELMS-UNIVERSITÄT BONN	Report	PU	18	31/05/2013	Submitted	
3	Reports on topical meetings on Tasks 1, 2, 3, 4	0.0	4	RHEINISCHE FRIEDRICH-WILHELMS-UNIVERSITÄT BONN	Report	PU	30	30/06/2014	Not submitted	
4	Precision calculations in strong interactions	0.0	4	RHEINISCHE FRIEDRICH-WILHELMS-UNIVERSITÄT BONN	Report	PU	36	31/12/2014	Not submitted	
5	Multi-quark and multi-hadron states calculations	0.0	4	RHEINISCHE FRIEDRICH-WILHELMS-UNIVERSITÄT BONN	Report	PU	36	31/12/2014	Not submitted	
6	Lattice methods and applications	0.0	4	RHEINISCHE FRIEDRICH-WILHELMS-UNIVERSITÄT BONN	Report	PU	36	31/12/2014	Not submitted	
7	Nuclear matter and phase of QCD calculations	0.0	4	RHEINISCHE FRIEDRICH-WILHELMS-UNIVERSITÄT	Report	PU	36	31/12/2014	Not submitted	

BONN										
1	"Summer camp" for students	1.0	5	UPPSALA UNIVERSITET	Other	PU	9	31/08/2012	Submitted	One more "camp" is planned for month 33
2	Data base on light mesons decays	1.0	5	UPPSALA UNIVERSITET	Other	PU	18	30/06/2013	Submitted	"A guide to experimental data" will be updated periodically.
3	Proceedings Workshop on "Light mesons physics"	1.0	5	UPPSALA UNIVERSITET	Other	PU	18	31/07/2012	Submitted	
4	Reports on topical meetings	0.0	5	UPPSALA UNIVERSITET	Other	PU	30	30/06/2014	Not submitted	
5	Proceedings Workshop on "Future prospects of light meson physics"	0.0	5	UPPSALA UNIVERSITET	Report	PU	36	31/12/2014	Not submitted	
1	Report on neutron detector for KAOS/A1 and HypHI	0.0	6	JOHANNES GUTENBERG UNIVERSITAET MAINZ	Report	PU	24	31/12/2013	Not submitted	
2	Technical report on tracking and trigger systems for HypHI	0.0	6	JOHANNES GUTENBERG UNIVERSITAET MAINZ	Report	PU	24	31/12/2013	Not submitted	
3	Technical report on HPGe cluster detector for PANDA	0.0	6	JOHANNES GUTENBERG UNIVERSITAET MAINZ	Report	PU	30	30/06/2014	Not submitted	
1	PANDA detector design	0.0	7	ISTITUTO NAZIONALE DI FISICA NUCLEARE	Report	PU	12	31/12/2014	Not submitted	The ECE FAIR committee responsible for approving detector design has only been settled in November 2012. Only the following components have been completely designed: Final design of central STT. Final design of the MVD. Final Design of the MTD. Final Design of the cluster-jet target system. Final Design of both the PANDA magnets. Final design of

										f the EMC.
2	CBM detector design	0.0	7	ISTITUTO NAZIONALE DI FISICA NUCLEARE	Report	PU	12	31/12/2014	Not submitted	The ECE FAIR committee responsible for approving detector design has only been settled in November 2012. Only the following components have been completely designed: Final design of the Superconducting Dipole Magnet; Final design of the STS; Final design of the PSD; Final design of the Ring Imaging Cherenkov detector.
3	Technical design reports on R&D on detectors, FEE and DAQ	1.0	7	ISTITUTO NAZIONALE DI FISICA NUCLEARE	Report	PU	18	31/12/2012	Submitted	
4	Construction and tests of prototypes	0.0	7	ISTITUTO NAZIONALE DI FISICA NUCLEARE	Prototype	PU	24	31/12/2013	Not submitted	
5	Reports on topical workshops	0.0	7	ISTITUTO NAZIONALE DI FISICA NUCLEARE	Report	PU	36	31/12/2014	Not submitted	
1	Proceedings "I Workshop theory - experiment "	0.0	8	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE	Report	PU	5	30/06/2014	Not submitted	The "I Workshop theory – experiment" been delayed to the end of 2013, consequently the proceeding will be available around March 2014.
2	Proceedings "II Workshop theory - experiment "	0.0	8	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE	Report	PU	30	30/06/2014	Not submitted	
1	SIDDHARTA-2 setup completed and ready for installation	2.0	9	OESTERREICHISCHE AKADEMIE DER	Other	PU	10	31/10/2012	Submitted	

				WISSENSCHAFTEN						
2	Precision data on hadronic atoms	0.0	9	OESTERREICHISCHE AKADEMIE DER WISSENSCHAFTEN	Report	PU	30	30/06/2014	Not submitted	
3	Theory results on low-energy antikaon-nucleon interaction	0.0	9	OESTERREICHISCHE AKADEMIE DER WISSENSCHAFTEN	Report	PU	32	31/08/2014	Not submitted	
4	Report on sub-threshold resonances	0.0	9	OESTERREICHISCHE AKADEMIE DER WISSENSCHAFTEN	Report	PU	32	31/08/2014	Not submitted	
5	Results of dedicated experiments on the search of deeply bound kaonic nuclear states	0.0	9	OESTERREICHISCHE AKADEMIE DER WISSENSCHAFTEN	Report	PU	36	31/12/2014	Not submitted	
1	Text book "Lattice QCD"	0.0	10	STIFTUNG DEUTSCHES ELEKTRONEN-SYNCHROTRON DESY	Other	PU	18	31/12/2013	Not submitted	The contract with Oxford University Press foresees a delivery date of December 2013.
2	Computer code for multi-core machines and GPUs	0.0	10	STIFTUNG DEUTSCHES ELEKTRONEN-SYNCHROTRON DESY	Report	PU	20	31/08/2013	Not submitted	
3	Report on low-energy constants for mesons and baryons	0.0	10	STIFTUNG DEUTSCHES ELEKTRONEN-SYNCHROTRON DESY	Report	PU	30	30/06/2014	Not submitted	
4	Report on meson and baryon resonances	0.0	10	STIFTUNG DEUTSCHES ELEKTRONEN-SYNCHROTRON DESY	Report	PU	30	30/06/2014	Not submitted	

5	Report on "Physics beyond the Standard Model"	0.0	10	STIFTUNG DEUTSCHES ELEKTRONEN-SYNCHROTRON DESY	Report	PU	30	30/06/2014	Not submitted
6	QCD phase diagram calculations	0.0	10	STIFTUNG DEUTSCHES ELEKTRONEN-SYNCHROTRON DESY	Report	PU	33	30/09/2014	Not submitted
7	Reports on Topical Workshops	0.0	10	STIFTUNG DEUTSCHES ELEKTRONEN-SYNCHROTRON DESY	Report	PU	30	30/06/2014	Not submitted
1	Transnational Access provision - multi annual implementation plan over 18 months.	2.0	11	FONDAZIONE BRUNO KESLER	Report	PU	18	30/06/2013	Submitted
2	Transnational Access provision - multi annual implementation plan over 36 months	0.0	11	FONDAZIONE BRUNO KESLER	Report	PU	36	31/12/2014	Not submitted
1	Transnational Access provision - multi annual implementation plan over 18 months	1.0	12	JOHANNES GUTENBERG UNIVERSITAET MAINZ	Report	PU	18	30/06/2013	Submitted
2	Transnational Access provision - multi annual implementation plan over 36 months	0.0	12	JOHANNES GUTENBERG UNIVERSITAET MAINZ	Report	PU	36	31/12/2014	Not submitted
1	Transnational Access provision - multi annual implementation plan over 18 months	1.0	13	GSIL HELMHOLTZZENTRUM FUERSCHWERIONENFORSCHUNG GMBH	Report	PU	18	30/06/2013	Submitted
2	Transnational Access provision - multi annual implementation plan over 36 months	0.0	13	GSIL HELMHOLTZZENTRUM FUERSCHWERIONENFORSCHUNG GMBH	Report	PU	36	31/12/2014	Not submitted

1	Transnational Access provision - multi annual implementation plan over 18 months	1.0	14	FORSCHUNGS ZENTRUM JUELICH GMBH	Report	PU	18	30/06/2013	Submitted	
2	Transnational Access provision - multi annual implementation plan over 36 months	0.0	14	FORSCHUNGS ZENTRUM JUELICH GMBH	Report	PU	36	31/12/2014	Not submitted	
1	Transnational Access provision - multi annual implementation plan over 18 months	1.0	15	ISTITUTO NAZIONALE DI FISICA NUCLEARE	Report	PU	18	30/06/2013	Submitted	
2	Transnational Access provision - multi annual implementation plan over 36 months	0.0	15	ISTITUTO NAZIONALE DI FISICA NUCLEARE	Report	PU	36	31/12/2014	Not submitted	
1	Optimization of pad assemblies with new single-channel amplifiers using # and #-sources	2.0	16	GSI HELMHOLTZZENTRUM FUERSCHWERIONENFORSCHUNG GMBH	Prototype	PP	18	31/03/2013	Submitted	
2	Optimization of pad assemblies with new single channel amplifiers using hi and p beams	0.0	16	GSI HELMHOLTZZENTRUM FUERSCHWERIONENFORSCHUNG GMBH	Prototype	PP	27	31/03/2014	Not submitted	
3	Pad assemblies with new single-channel low capacitance broadband amplifier (LCBA) signal readout	0.0	16	GSI HELMHOLTZZENTRUM FUERSCHWERIONENFORSCHUNG GMBH	Prototype	PP	30	30/06/2014	Not submitted	
4	3x3 cm**2 Dia-on-Ir samples of low dislocation density	0.0	16	GSI HELMHOLTZZENTRUM FUERSCHWERIONENFORSCHUNG GMBH	Demonstrator	CO	34	31/10/2014	Not submitted	
5	One-dimensional microstrip assemblies with PA DI-4 signal readout	0.0	16	GSI HELMHOLTZZENTRUM FUERSCHWERIONENFORSCHUNG GMBH	Prototype	PP	36	31/12/2014	Not submitted	

1	Report on the production of prototypes of low mass polarizing solenoids for DNP at high fields	1.0	17	RUHR-UNIVERSITÄT BOCHUM	Report	PU	18	30/06/2013	Not submitted	
2	Prototypes of low mass polarizing solenoids for DNP at high fields for ELSA and MAMI experiments	0.0	17	RUHR-UNIVERSITÄT BOCHUM	Prototype	PU	30	30/06/2014	Not submitted	
3	Design of low mass polarized target system for GPD measurements with COMPASS	0.0	17	RUHR-UNIVERSITÄT BOCHUM	Report	PU	36	31/12/2014	Not submitted	
1	Assessment of the QE of improved MWCNT	0.0	18	ISTITUTO NAZIONALE DI FISICA NUCLEARE	Report	PU	36	31/12/2014	Not submitted	
2	Full characterization of a small size prototype of a photon detector with MPPGD architecture	1.0	18	ISTITUTO NAZIONALE DI FISICA NUCLEARE	Prototype	PU	18	30/04/2013	Submitted	
3	Full characterization of a large size prototype of a photon detector with MPPGD architecture fully equipped with read-out electronics	0.0	18	ISTITUTO NAZIONALE DI FISICA NUCLEARE	Prototype	PU	36	31/12/2014	Not submitted	
1	Report on the implementation of large-area, high granularity, two-dimensional position sensitive TRD	1.0	19	WESTFAELISCHE WILHELMS-UNIVERSITÄT MÜNSTER	Report	PU	15	30/06/2013	Not submitted	
2	Large-area, high granularity, two-dimensional TRD prototypes	0.0	19	WESTFAELISCHE WILHELMS-UNIVERSITÄT MÜNSTER	Prototype	PU	30	30/06/2014	Not submitted	
3	Operational high-rate RPC	0.0	19	WESTFAELISCHE WILHELMS-UNIVERSITÄT MÜNSTER	Prototype	PU	25	31/01/2014	Not submitted	

1	New nozzle production line for cluster-jet targets	0.0	20	WESTFAELIS CHE WILHELMUS-UNIVERSITAET MÜNSTER	Other	PU	30	30/06/2014	Not submitted	
2	Report on measurements of micro-jet instabilities and fluctuations of target density	0.0	20	WESTFAELIS CHE WILHELMUS-UNIVERSITAET MÜNSTER	Report	PU	25	31/01/2014	Not submitted	
3	Report on laser induced breakup of liquid hydrogen in pellet target	0.0	20	WESTFAELIS CHE WILHELMUS-UNIVERSITAET MÜNSTER	Report	PU	18	31/12/2014	Not submitted	The possibilities of testing the influence of a laser beam on the liquid jet at the UPTS are being investigated according to plans. It turns out that, due to technical and mechanical reasons, it will be difficult to make direct tests of laser induced jet breakup at UPTS within the present project. Consequently, deliverable has been cancelled.
4	Report on production of smallest diameters and highest frequencies in pellet beam sources	1.0	20	WESTFAELIS CHE WILHELMUS-UNIVERSITAET MÜNSTER	Report	PU	36	30/06/2013	Not submitted	
5	Prototype of an optical tracking system of individual pellets based on lasers and line scan cameras	0.0	20	WESTFAELIS CHE WILHELMUS-UNIVERSITAET MÜNSTER	Prototype	PU	36	31/12/2014	Not submitted	
1	Prototypes for photon detection devices with new amplification structures	0.0	21	UNIVERSITY OF GLASGOW	Prototype	RE	27	31/03/2014	Not submitted	
2	Prototype for the study of dispersion effects in the DIRC for WA SA at COSY	2.0	21	UNIVERSITY OF GLASGOW	Prototype	RE	18	30/06/2013	Submitted	
3	Installation and commissioning	0.0	21	UNIVERSITY	Prototype	RE	30	30/06/2014	Not submitted	

	oning of the DIRC for WASA at COSY			OF GLASGOW						
1	Report on the optimization of the growing technology and characterization of fibers	1.0	22	JUSTUS-LIEBIG-UNIVERSITÄT GIESSEN	Report	PU	18	30/06/2013	Not submitted	
2	Production of LYSO:Ce fibers of different diameters and of quality similar to bulk crystals	0.0	22	JUSTUS-LIEBIG-UNIVERSITÄT GIESSEN	Demonstrator	PU	32	31/08/2014	Not submitted	
3	Production of fiber bundles made of LYSO:Ce	0.0	22	JUSTUS-LIEBIG-UNIVERSITÄT GIESSEN	Demonstrator	PU	34	31/10/2014	Not submitted	
1	Report on the development of silicon-based multi-pixel photon detectors	0.0	23	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE	Report	PU	18	31/12/2014	Not submitted	Drafting in progress
2	Characterization of silicon-based multi-pixel photon detectors for RPD and ECALO of COMPASS II	0.0	23	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE	Report	PU	36	31/12/2014	Not submitted	
3	Report on the implementation of a TIGER module for the RPD of COMPASS II	0.0	23	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE	Report	PU	18	31/12/2014	Not submitted	Drafting in progress
4	Development of a TIGER module for a trigger	0.0	23	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE	Demonstrator	PU	36	31/12/2014	Not submitted	
5	Production of a prototype RPD for COMPASS II	0.0	23	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE	Prototype	PU	24	31/12/2013	Not submitted	
6	Design for an ASIC for the FEE of the Central Tracker of CLAS12	0.0	23	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE	Report	PU	30	30/06/2014	Not submitted	
7	Prototype of the Central Neutron Detector of CLAS12	0.0	23	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE	Prototype	PU	24	31/12/2013	Not submitted	

				SCIENTIFIQUE						
8	Technical Design Report for the Forward Tracker of CLASS12	0.0	23	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE	Report	PU	30	30/06/2014	Not submitted	
1	Prototype hydrogen TPC	0.0	24	OESTERREICHISCHE AKADEMIE DER WISSENSCHAFTEN	Prototype	PU	30	30/06/2014	Not submitted	
2	Report on the stretching technique to produce large-area GEM foils	0.0	24	OESTERREICHISCHE AKADEMIE DER WISSENSCHAFTEN	Report	PU	15	31/07/2013	Not submitted	Drafting in progress
3	Prototype large area planar GEM	0.0	24	OESTERREICHISCHE AKADEMIE DER WISSENSCHAFTEN	Prototype	PU	30	30/06/2014	Not submitted	
4	Prototype large TPC with full readout	0.0	24	OESTERREICHISCHE AKADEMIE DER WISSENSCHAFTEN	Prototype	PU	30	30/06/2014	Not submitted	
1	Report on the development of a concept for low- β section for AD	2.0	25	FORSCHUNGSZENTRUM JUELICH GMBH	Report	PU	12	31/12/2012	Submitted	
2	Report on experimental setup commissioning for the AD at COSY	0.0	25	FORSCHUNGSZENTRUM JUELICH GMBH	Report	PU	30	30/06/2014	Not submitted	
3	Design and commissioning of a Siberian snake at COSY	0.0	25	FORSCHUNGSZENTRUM JUELICH GMBH	Report	PU	28	30/04/2014	Not submitted	
4	Final report including the first spin-filtering studies at COSY	0.0	25	FORSCHUNGSZENTRUM JUELICH GMBH	Report	PU	32	31/08/2014	Not submitted	
1	Report on full-size high-density front-end board compatible with the CBM micro-strip trackers	0.0	26	GSI HELMHOLTZZENTRUM FUER SCHWERIONENFOR	Report	PU	36	31/12/2014	Not submitted	

	ystem			SCHUNG GMBH					
2	Demonstrator of a full y i ntegrated FEB with the hi gh density input stage	0.0	26	GSI HELMHOLTZZENTRUM FUER SCHWERIONENFORSCHUNG GMBH	Demonstrator	PU	30	30/06/2014	Not submitted
3	Report on the low-power, low-mass front-end module based on ASIC and AI cables	0.0	26	GSI HELMHOLTZZENTRUM FUER SCHWERIONENFORSCHUNG GMBH	Other	PU	36	31/12/2014	Not submitted
4	Report on the performance under test beam of a prototype silicon embedded chip assembly	0.0	26	GSI HELMHOLTZZENTRUM FUER SCHWERIONENFORSCHUNG GMBH	Report	PU	36	31/12/2014	Not submitted
1	High Level Trigger implementation for correlation measurements	0.0	27	ISTITUTO NAZIONALE DI FISICA NUCLEARE	Other	PU	24	31/12/2013	Not submitted
2	Theoretical model developments and modelizations in Monte Carlo	0.0	27	ISTITUTO NAZIONALE DI FISICA NUCLEARE	Other	PU	36	31/12/2014	Not submitted
3	Results on Di-Jet and #-jet reconstruction in heavy ion collisions	0.0	27	ISTITUTO NAZIONALE DI FISICA NUCLEARE	Other	PU	36	31/12/2014	Not submitted
1	64-pixel photo sensor matrix for working in high magnetic fields	0.0	28	GSI HELMHOLTZZENTRUM FUER SCHWERIONENFORSCHUNG GMBH	Demonstrator	PU	36	31/12/2014	Not submitted
2	SiPM coupling to advanced fiber detectors	0.0	28	GSI HELMHOLTZZENTRUM FUER SCHWERIONENFORSCHUNG GMBH	Demonstrator	PU	33	30/09/2014	Not submitted
3	SciTil plastic scintillator detector for TO F applications	0.0	28	GSI HELMHOLTZZENTRUM FUER SCHW	Prototype	PU	33	30/09/2014	Not submitted

				ERIONENFOR SCHUNG GMBH					
1	CLAS12 RICH prototype	0.0	29	ISTITUTO N AZIONALE DI FISICA N UCLEARE	Prototype	PP	27	31/03/2014	Not submitted
2	RICH Technical Design Report	0.0	29	ISTITUTO N AZIONALE DI FISICA N UCLEARE	Report	PU	36	31/12/2014	Not submitted
3	Report on the fundame ntal properties of TMD s	0.0	29	ISTITUTO N AZIONALE DI FISICA N UCLEARE	Report	PU	36	31/12/2014	Not submitted
4	Report on global anal yses of TMDs	0.0	29	ISTITUTO N AZIONALE DI FISICA N UCLEARE	Report	PU	36	31/12/2014	Not submitted
5	Data base for TMDs	0.0	29	ISTITUTO N AZIONALE DI FISICA N UCLEARE	Other	PU	29	31/05/2014	Not submitted
6	Reports on topical wor kshops	0.0	29	ISTITUTO N AZIONALE DI FISICA N UCLEARE	Report	PU	32	31/08/2014	Not submitted

Milestones

Milestone no.	Milestone name	Work package no	Lead beneficiary	Delivery date from Annex I	Achieved Yes/No	Actual / Forecast achievement date	Comments
1	Enter into force of managerial bodies	WP1	1	31/03/2012	Yes	31/03/2012	
2	Creation of the project website	WP1	1	31/03/2012	Yes	31/03/2012	
3	Management Board mee ting	WP1	1	31/03/2012	Yes	31/03/2012	
4	Management Board mee ting	WP1	1	30/09/2012	Yes	30/09/2012	

5	Management Board meeting	WP1	1	31/03/2013	Yes	31/03/2013	
9	Dissemination Board meeting	WP1	1	30/06/2012	Yes	30/06/2012	
10	Dissemination Board meeting	WP1	1	31/12/2012	Yes	31/12/2012	
11	Dissemination Board meeting	WP1	1	30/06/2013	Yes	30/06/2013	
14	Governing Board meeting	WP1	1	31/03/2012	Yes	31/03/2012	
15	Governing Board meeting	WP1	1	30/06/2013	Yes	30/06/2013	
17	First Periodic Report	WP1	1	30/06/2013	Yes	30/06/2013	
21	I Workshop 2013	WP2	31	30/06/2013	No	31/12/2014	The workshop originally foreseen for 2013 has been shifted to 2014. It will take place from June 9-14, 2014.
25	Workshop on "Light meson physics"	WP5	45	30/06/2013	Yes	30/06/2012	The workshop was named "MesonNet meson transition form factors workshop"
30	PANDA detector design completed	WP7	1	31/12/2012	No	31/12/2014	FAIR GmbH has delayed the schedule. Therefore the complete design of the PANDA detector has been postponed.
31	CBM detector design completed	WP7	1	31/12/2012	No	31/12/2014	FAIR GmbH has delayed the schedule. Therefore the complete design of the CBM detector has been postponed.
32	R&D on detectors completed	WP7	1	30/06/2013	No	31/12/2013	Since the design of both PANDA and CBM is not yet completed, there are still R&D activities on going.
33	FEE and DAQ completed	WP7	1	30/06/2013	No	31/12/2014	FEE and DAQ are usually the last items that are

							frozen in any experiments. These items become obsolete very soon and therefore it would be better to wait for the last technical developments.
35	I Workshop theory - experiment	WP8	31	31/05/2012	No	31/12/2013	Date fixed: December 2nd-5th 2013, Nantes, France
37	SIDDHARTA-2 setup operational	WP9	2	31/12/2012	No	31/12/2014	The schedule of the installation of SIDDHARTA-2 at DAFNE is up-to-now unclear due to the missing decision about the access of SIDDHARTA-2 to DAFNE and beam time schedule
38	Editing of the "Lattice QCD" book	WP10	8	30/06/2013	No	31/12/2013	The contract with Oxford University Press foresees a delivery date of December 2013.
39	Pad assemblies #,#-tests performed	WP16	12	30/06/2013	Yes	31/12/2012	
45	Characterization of a small size prototype of a photon detector with MIPGD architecture performed	WP18	1	30/12/2013	Yes	30/04/2013	Report available 8 months in advance
48	Installation of the DIRC into WASA at COSY completed	WP21	48	30/09/2012	No	31/12/2014	External factors at COSY make a delivery uncertain. The consortium is evaluating and pursuing different options to achieve the important aims

4. Explanation of the use of the resources

The **explanation on the use of resources** was removed from the scientific periodic reports in SESAM. These details now have to be entered in the cost statement forms in FORCE instead.

5. Transnational Access DataBase

Summary of transnational access provision per installation per reporting period

Particip num	Organisation name	Infrastructure name	Installation num	Installation name	Unit of access	Min. quantity of access to be provided in Annex I	Access provided in RP1	Access provided in RP2	Access provided in RP3	Access provided in RP4	Total access provided	Difference
35	FBK	ECT*	1	ECT*	Visitor-Day	2040	905	0	0	0	905.00	
11	FZJ	COSY	1	COSY	Beam-hour	1800	1728	0	0	0	1728.00	
12	GSI	GSI	1	SIS	Beam-hour	1500	682	0	0	0	682.00	
1	INFN	INFN-LNF	1	DAFNE	Beam-hour	2400	1198.7	0	0	0	1198.70	
21	UMainz	MAMI	1	MAMI	Beam-hour	1980	990	0	0	0	990.00	

Attachments	
Grant Agreement number:	283286
Project acronym:	HadronPhysics3
Project title:	Study of Strongly Interacting Matter
Funding Scheme:	FP7-CP-CSA-Infra
Project starting date:	01/01/2012
Project end date:	31/12/2014
Name of the scientific representative of the project's coordinator and organisation:	Dr. Carlo Guaraldo ISTITUTO NAZIONALE DI FISICA NUCLEARE
Period covered - start date:	01/01/2012
Period covered - end date:	30/06/2013
Name	
Date	

This declaration was visaed electronically by (ECAS user name nguaraca) on