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I. INTRODUCTION

The work presented in this report is supported by the Université Libre de Bruxelles (ULB), the Vrije Universiteit Brussel (VUB), the Fonds de la Recherche Scientifique (F.R.S.–FNRS), the Fonds voor Wetenschappelijk Onderzoek–Vlaanderen (FWO), the Fonds pour la Formation à la Recherche dans l'Industrie et dans l'Agriculture (FRIA), the Instituut voor de aanmoediging van Innovatie door Wetenschap en Technologie in Vlaanderen (IWT), the Belgian Federal Science Policy Office and the European Union.

Here follows the list of scientists, engineers, technical and logistic personnel who have contributed to the various activities of the Institute in 2008.

I.1 U.L.B.

I.1.1 Academic and Scientific Personnel

V. Adler (chercheur PAI till May 2008)
 S. Bechet (doctorant)
 D. Bertrand (directeur de recherche F.R.S.–FNRS ; chargé de cours à temps partiel)
 O. Bouhali (informaticien till October 2008)
 E. Chabert (chercheur PAI since November 2008)
 O. Charaf (doctorant IISN)
 B. Clerboux (chercheur qualifié F.R.S.–FNRS; chargé de cours à temps partiel)
 G. De Lentdecker (chercheur qualifié F.R.S.–FNRS)
 J. Delvax (boursière FRIA)
 V. Dero (doctorant IISN)
 S. Elgammal (doctorant IISN)
 L. Favart (chercheur qualifié F.R.S.–FNRS; chargé de cours à temps partiel)
 G. Hammad (boursier FRIA)
 K. Hanson (chargé de cours since December 2008)
 T. Hreus (boursier FRIA until September 2008 ; post–doc PAI since October 2008)
 X. Janssen (chercheur F.R.S.–FNRS)
 M. Labare (doctorant PAI)
 P. Marage (professeur ordinaire)
 J. Petrovic (chercheur PAI till August 2008)
 Y. Piersaux (collaborateur scientifique)
 B. Roland (boursier Van Buuren till September 2008)
 J. Sacton (professeur émérite)
 Q. Swillens (boursier FRIA)
 R. Toncelli (collaborateur scientifique)
 C. Vander Velde (professeur)
 P. Vanlaer (1er assistant)
 P. Vilain (maître de recherche F.R.S.–FNRS ; chargé de cours temps partiel)
 G. Wilquet (maître de recherche F.R.S.–FNRS till November 2008 ; chargé de cours temps partiel; professeur de l'Université since December 2008)

I.1.2 Engineers, Technical and Logistic Personnel

P. De Harenne (technicien)
 J.-P. Dewulf (ingénieur)
 L. Etienne (ingénieur)
 D. Peymans (secrétaire)
 G. Rousseau (informaticien)
 S. Rugovac (informaticien)
 E. Torisaen (informaticien)
 G. Van Beek (ingénieur)
 R. Vanderhaeghen (technicien)
 Y. Yang (support logistique since September 2008)

I.2 V.U.B.

I.2.1 Academic and Scientific Personnel

V. Adler (postdoctoraal onderzoeker FWO since June 2008)
 P. Bruyndonckx (wetenschappelijk medewerker GOA till September 2008, 10% docent from January till December 2008)
 J. Dang (wetenschappelijk medewerker China Scholarship Council)
 C. De Clercq (hoofddocent)
 O. Depaepe (IWT specialisatiebeurs)
 O. Devroede (wetenschappelijk medewerker FWO)
 S. De Weirdt (wetenschappelijk medewerker FWO till June 2008)
 J. D'Hondt (ZAP docent, postdoctoraal onderzoeker FWO)
 J. Heyninx (IWT specialisatiebeurs till May 2008)
 D. Hubert (wetenschappelijk medewerker: OZR-VUB till September 2008 – FWO since October 2008)
 J. Lemonne (gewoon hoogleraar, professor-emeritus)
 J. Maes (IWT specialisatiebeurs)
 M. Mozer (wetenschappelijk medewerker : FWO till May 2008 – IUAP since June 2008)
 N. Pereiro (wetenschappelijk medewerker GOA)
 A. Rizzo (wetenschappelijk medewerker FWO)
 R. Roosen (onderzoeksdirecteur FWO)
 S. Tavernier (gewoon hoogleraar)
 F. Udo (wetenschappelijk medewerker till September 2008)
 W. Van Doninck (onderzoeksdirecteur FWO, on leave of absence at CERN)
 P. Van Mulders (IWT specialisatiebeurs)
 I. Villella (wetenschappelijk medewerker: FWO till May 2008 – IUAP since June 2008)
 M. Wedrowski (wetenschappelijk medewerker Bilateraal akkoord Vlaanderen-Polen)
 L. Zhi (wetenschappelijk medewerker Bilateraal akkoord Vlaanderen-China till June 2008)
 E. Wieers (wetenschappelijk medewerker, XIOS Limburg till September 2008)

I.2.2 Engineers, Technical and Logistic Personnel

R. Alluyn (till June 2008 – technicus)
 J. Debruyne (50% – technicus)
 A. De Coster (technicus)
 M. Goeman (technicus)
 R. Goorens (50% – ingenieur)
 S. Hannaert (technicus)

A. Ouchene (technicus)
D. Pirnay (50% – technicus)
R. Vandenbroucke (informaticus)
L. Van Lancker (ingenieur)
C. Wastiels (50% – technicus)

W. Beaumont, M. Cardaci, E. Delanghe, E. Delmeire, A. De Roeck, M. Hashemi, S. Ochesanu, M. Ripert, D. Sunar, T. Sykora, P. Van Mechelen, N. Van Remortel and E. De Wolf from the Universiteit Antwerpen (UA) have been working in close collaboration with the Institute.

Research in the field of telecommunications and data communication were conducted at IIHE by O. Bouhali and R. Vandenbroucke in collaboration with the members of the "Service Télématique et Communication" led by P. Van Binst at the ULB until September 2008.

II. RESEARCH ACTIVITIES IN PARTICLE AND ASTROPARTICLE PHYSICS

II.1 NEUTRINO PHYSICS

A. THE CHORUS EXPERIMENT (CERN WA95)

(P. Vilain, G. Wilquet)

The main purpose of the experiment was the search for ν_μ - ν_τ oscillation through the observation for the reaction $\nu_\tau + N \rightarrow \tau^- + \text{hadrons}$. The final result of this analysis has been published in 2008.

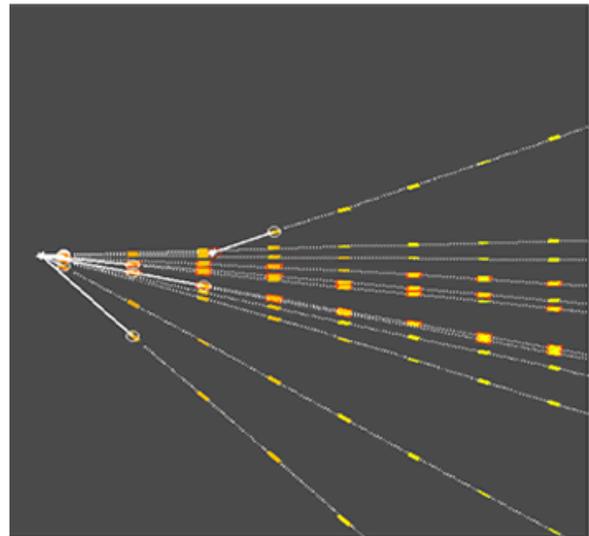
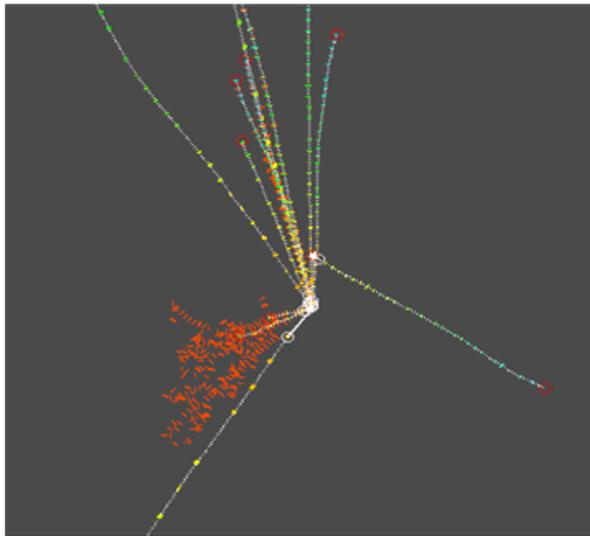
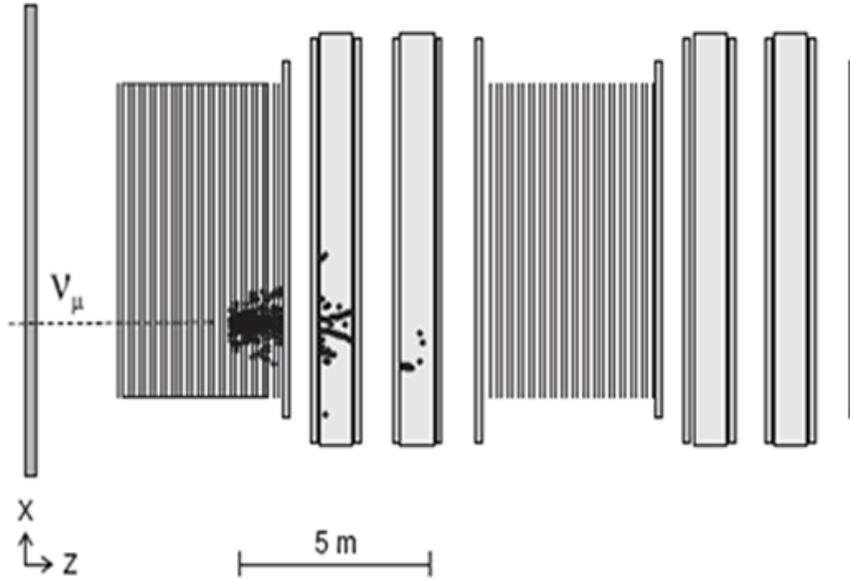
- Final results on $\nu_\mu \rightarrow \nu_\tau$ oscillation from the CHORUS experiment.
A. Kayis-Topaksu et al.
Nuclear Physics B 793 (2008) 326
CERN-PH-P/2007-034, arXiv:0710.3361

The analysis of the sample of 2013 charged-current interactions with a charmed hadron in the final state has been completed. One paper on the di-muon production rate has been published in 2008 and a global paper combining the results on the neutral and charged charm decays is about to be submitted for publication:

- Leading Order Analysis of neutrino induced di-muon events in the CHORUS experiment
A. Kayis-Topaksu et al.
Nuclear Physics B 798 (2008) 1
- Measurement of charm production in neutrino charged-current interactions
G. Onengüt et al.
To be submitted to Nuclear Physics

B. THE OPERA EXPERIMENT (CERN CNGS1).

(G. Van Beek, P. Vilain, G. Wilquet)



The figure on the top shows the event as recorded in the electronic detectors. The overall length of the picture is about 20 m. The two figures on the bottom show the transverse and the longitudinal views of the event in the emulsion/lead ECC target. The kink topology compatible with a charm hadron decay is clearly seen. The decay length is 3247 μm and the P_T of the secondary particle measured by Coulomb multiple scattering is larger than 606 MeV/c at 90% CL. This makes the event incompatible with the decay of a charged π or a strange hadron. The probability that it is a hadron scattering in the lead is 4×10^{-4} . The transverse view also shows the electromagnetic showers left by two γ pointing to the primary vertex. Their energies have been estimated by counting the numbers of track segments and are compatible with the decay of a π^0 .

The OPERA experiment aims to detect for the first time the appearance of ν_τ in a ν_μ beam and to confirm the oscillation parameters indicated by the study of atmospheric neutrinos. The

detector is installed in the underground Gran Sasso Laboratory (LNGS) on the axis of the CNGS neutrino beam produced at CERN, 730 km away. The design of the detector takes into account two conflicting requirements: a large target mass, to cope with the small intercepted neutrino flux and cross-section, and a micrometric resolution, to allow the detection of the short-lived tau lepton. The target is made of 150000 basic units, called bricks, each consisting of 56 lead plates of 1 mm thickness interleaved with emulsion films, for a total weight of 1250 tons. It is instrumented with 124 layers of plastic scintillator strips to measure the trajectory of charged particles and locate the brick where a neutrino interaction occurred. The instrumented target is divided into two identical super-modules. Downstream of each of these, a magnetic spectrometer is used to measure the momentum and charge of the penetrating muons.

Our group was more specifically involved in the conception, construction and installation of the target trackers together with two groups of IN2P3 (IPHC, Strasbourg and LAPP, Orsay), the universities of Bern and Neuchâtel, and JINR, Dubna. This has been the subject of a publication in 2007. The commissioning of the electronic detectors has been completed in 2007 and the filling of the target was achieved in the summer 2008. A review of its design and a report on the technical performance of its various components is about to be published:

- The OPERA experiment in the CERN to Gran Sasso neutrino beam
R. Acquafredda et al.
Accepted for publication by JINST

More specific aspects of the final brick design were recently published:

- Study of the effects induced by lead on the emulsion films of the OPERA experiment
A. Anokhina et al.
JINST, 2008, P07002, 20
- Emulsion sheet doublets as interface trackers for the OPERA experiment
A. Anokhina et al.
JINST, 2008, P07005, 22

A very short run with CNGS neutrinos was carried out in 2007, with the detector partially filled with bricks, and a more significant one in 2008, with a fully operational detector. The whole sequence of operations has proven to be successful, from triggering to brick selection, development, scanning and event analysis. Up to now, about 1700 ν_{μ} interactions in the target have been recorded. A report on the reconstruction and analysis procedures of this first sample has been submitted for publication:

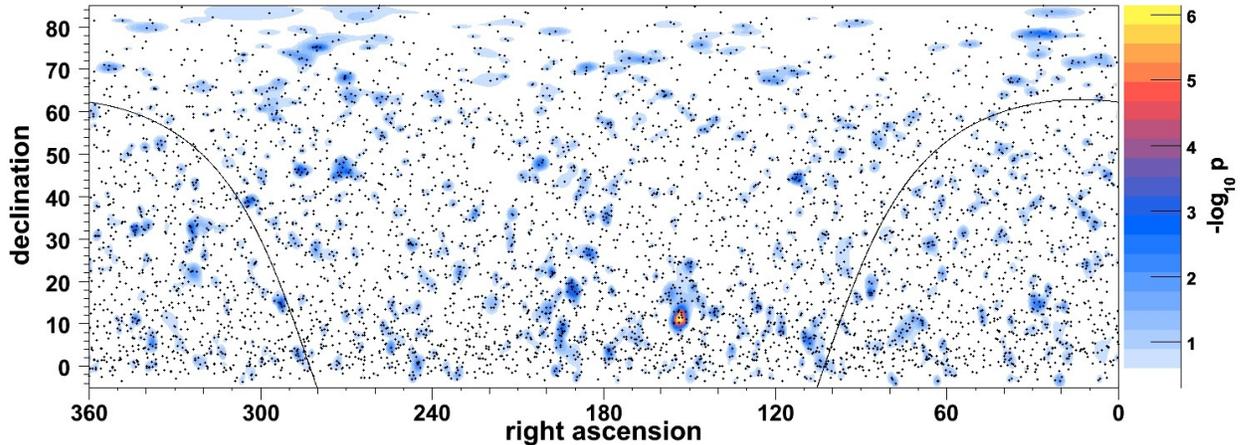
- Detection of neutrino interactions in the emulsion/lead target of the OPERA experiment
N. Agafonova et al.
arXiv: 0903.2973v1 (hep-ex)
Submitted to JINST

The experiment is scheduled to run until 2012 and should collect about 30000 neutrino interactions in the bricks, of which a dozen are expected to be identified as ν_{τ} charged current interactions.

The OPERA Collaboration includes about 200 physicists from 35 institutions in 11 countries. One of us (G. W.) is the current Chairman of the Collaboration Board and of the Editorial Board.

C. THE ICECUBE EXPERIMENT

(D. Bertrand, S. Bechet, C. De Clercq, O. Depaepe, D. Hubert, M. Labare, J. Petrovic, A. Rizzo and Q. Swillens)



Northern hemisphere neutrino sky map in equatorial coordinates based on the IceCube data taken in 2008 (22 string detector, 276 days livetime). Each dot represents the origin of one of the 5100 detected muon neutrinos. The possible hotspot at (declination 11° , right ascension 153°) is compatible with a statistical fluctuation of the atmospheric neutrino flux.

This research project is pursued in collaboration with J.-M. Frère (“Professeur Ordinaire” in theoretical physics at the ULB), co-promotor at the FNRS level.

The AMANDA neutrino telescope is designed for the observation of high energy neutrinos from astrophysical sources in the northern hemisphere. The detector is located at the geographical South Pole and consists of 677 photo multiplier tubes (PMT) of a diameter of 8 inches deployed on a cylindrical array of a diameter of 200m and a height of 500m in the Antarctic ice at a depth of 1500m. A telescope of a second generation, IceCube, is presently under construction. A volume of 1 km^3 will be equipped with a total of 4800 PMT's of a diameter of 10 inches at depths between 1500 and 2300m completed by 160 surface stations made of 2 m^3 ice tanks containing 2 PMT's each. The PMT's measure the Cherenkov light emitted in the ice by charged relativistic particles, like the muons produced in charged current muon-neutrino interactions below the detector or the light resulting from cascades produced by electron or tau-neutrinos in the detector.

Since the beginning of 2009, 3480 IceCube PMT's are deployed on 58 strings in the ice and 116 tanks are installed on the surface. This represents about 70% of the Icecube telescope. As the drilling procedure has reached a high level of performance and reliability (19 holes were drilled during this year campaign) it has been decided to complete the IceCube detector by 6 high density DOM strings at high depth. This so-called IceCube Deep Core is intended to replace AMANDA 2010 onwards. The first Deep Core string was installed in this year campaign. These DOMs are deployed in a region of very pure ice identified by the data collected by the IceCube strings already deployed. The IceCube detector will be used as a veto surrounding the Deep Core detector allowing observations towards the Galactic center. The short spacing of the DOM's (7m vertically and $\sim 40\text{m}$ horizontally) will allow a lower energy threshold for the detector ($\sim 10 \text{ GeV}$) as well as better energy and angular resolutions. These performances will benefit to the indirect WIMP searches, the neutrino oscillation studies and to the point-like neutrino source searches in the southern hemisphere.

The data taking is now in a steady state. The analysis of the data taken since 2007 (IC-22 with 22 strings in 2007, IC-40 with 40 strings in 2008) is going on. Preliminary results from a search for point sources of high energy neutrinos with IC-22 show no evidence for a signal and

were published at conferences (see figure). The search for neutralino dark matter accumulated in the Sun gave a negative result and showed that for masses above $250 \text{ GeV}/c^2$ the sensitivity of IceCube to spin dependent processes is 3 orders of magnitude better than the direct search experiments.

The main results published in 2008 by the IceCube collaboration are:

- **The Search for Muon Neutrinos from Northern Hemisphere Gamma-Ray Bursts with AMANDA**

In collaboration with the InterPlanetary Network.

A search was performed for muon neutrinos correlated with photon observations of more than 400 gamma-ray bursts (GRB) in the northern hemisphere from 1997 to 2003. After application of all selection criteria to the data, one neutrino event was expected and < 2 background events. Based on the observation of zero neutrino events during and immediately prior to the GRBs in the data set, the most stringent upper limit could be set on neutrino emission correlated to GRBs. Assuming a Waxman-Bahcall spectrum and incorporating all systematic uncertainties, our flux limit has a normalization at 1 PeV of $E^2 \Phi_\nu \leq 6.3 \times 10^{-9} \text{ cm}^{-2} \text{ s}^{-1} \text{ sr}^{-1}$, with 90% of the events expected within the energy range of 10 TeV to 3 PeV. Other models, as e.g. proposed by Razzaque et al.(2003), have been ruled out.

- **Search for Ultra High-Energy Neutrinos with AMANDA-II**

A search for diffuse neutrinos with energies in excess of 10^5 GeV was conducted with the AMANDA-II data taken in 2000-2002. Above 10^7 GeV the Earth is essentially opaque to neutrinos, and most ultra-high energy neutrinos which reach AMANDA are concentrated at the horizon. The primary background for this analysis is bundles of downgoing, high-energy muons from the interaction of cosmic rays in the atmosphere. No statistically significant excess above the expected background was seen in the data, and an upper limit could be set on the diffuse all-flavour neutrino flux of $E^2 \Phi_{90\%} < 2.7 \times 10^{-7} \text{ GeV s}^{-1} \text{ sr}^{-1}$, valid over the energy range of 10^5 to 10^9 GeV . A number of models that predict neutrino fluxes from active galactic nuclei are excluded at the 90% confidence level.

Activities of the IIHE group

The data taken with AMANDA II in 2001-03 have been analyzed with the aim of searching for WIMP annihilations in the sun. The main effort was put on the selection procedure, the data quality verification and on the simulations. The trigger conditions to accept data were also extended to include low threshold string triggered events with a large gain in statistics for WIMP masses below 200 GeV. The results from this analysis have been unblinded and will be published this year. Since IceCube is now larger than AMANDA it was decided to combine the full 2001-06 dataset in a search for neutralinos from the Sun. This analysis started in 2006 and is performed by our groups. The unblinded results are expected for the end of this year. In 2007, a new analysis based on a search for Kaluza-Klein dark matter in the Sun was started. The data taken by IceCube in 2009 will be used, including the nucleus of the new Deep Core detector.

We developed a new strategy of point source search based on the False Discovery Rate method which was already used in other astrophysical studies (WMAP analysis, search for galaxy clusters, ...). As the method is only based on the background distribution, limits can be derived without any assumption on acceleration mechanisms inside the sources. Moreover, the robustness of the method could lead to a gain in sensitivity of the analysis. The method was applied to the full AMANDA II dataset (2000-2006) and the request for unblinding the data is now being evaluated. The results of this analysis will be published this year.

Finally, a new analysis was started at the end of 2007, aiming at the identification of tau neutrino interactions inside IceCube. This kind of events are less sensitive to the background and could lead to a better estimation of the very high energy ($> 10^{17}$ eV) flux of cosmic neutrinos.

- The IIHE group has taken part in the following service tasks:
- Deployment of the DOMs at the South Pole;
- Data quality checking in the framework of the online monitoring;
- Detailed checks of the 2008 real and simulated data, and data-MC comparison.

II.2 STUDY OF $E^+ E^-$ ANNIHILATION AT LEP – THE DELPHI EXPERIMENT

(D. Bertrand, C. De Clercq, J. D'Hondt, J. Lemonne and J. Wickens)

During 12 years, between 1989 and 2000, the DELPHI experiment has taken about 4 million events at the Z^0 resonance (LEP I experiment), and about 10,000 W -pair events at energies between 161 and 209 GeV (LEP II experiment).

The analysis of the data is nearly finished and the last Collaboration meeting took place in June 2008. These last years, the physicists of the laboratory were mainly involved in the analysis of the tau lepton production and decay properties, the study of the W polarisation and the estimation of the charged triple-gauge-boson couplings. A total of 6 papers were published in 2008. The IHE group contributed to the following results:

- Measurement of the tau lepton polarisation at LEP2: This was a first measurement of the average polarisation of tau leptons produced in e^+e^- annihilation at energies significantly above the Z resonance. The polarisation was determined from the kinematic spectra of tau hadronic decays. The measured value $P_\tau = -0.164 \pm 0.125$ is consistent with the Standard Model prediction for the mean LEP energy of 197 GeV.
- Study of W -boson polarisations and triple gauge boson couplings in the reaction $e^+e^- \rightarrow W^+W^- \rightarrow l\nu q\bar{q}$ ($l = e/\mu$) at LEP2: The single W spin density matrix (SDM) elements in the reaction $e^+e^- \rightarrow W^+W^- \rightarrow l\nu q\bar{q}$ ($l = e/\mu$) were measured at centre-of-mass energies between 189 and 209 GeV. The data sample used corresponded to an integrated luminosity of 520 pb^{-1} taken by DELPHI between 1998 and 2000. The single W SDM elements were determined as a function of the W production angle with respect to the e^- beam direction and were obtained from measurements of the W decay products by the application of suitable projection operators, which assume the $V-A$ coupling of the W -boson to fermions.
- Measurement of the mass and width of the W boson in e^+e^- collisions at centre-of-mass energies between 161 and 209 GeV: This measurement was based on the data collected by DELPHI during the full LEP2 programme (1996–2000). The data sample has an integrated luminosity of 660 pb^{-1} . Results were obtained by applying the method of direct reconstruction of the mass of the W from its decay products in both the $W^+W^- \rightarrow l\nu q\bar{q}$ and $W^+W^- \rightarrow q\bar{q}q\bar{q}$ channels.

II.3 STUDY OF EP COLLISIONS AT HERA – THE H1 EXPERIMENT

(J. Delvax, E. De Wolf, L. Favart, T. Hreus, X. Janssen, P. Marage, B. Roland, R. Roosen, D. Sunnar, and P. Van Mechelen)

The HERA accelerator activity has been permanently closed in July 2007 after 15 years of successful service. To allow a direct measurement of the longitudinal structure function, the high energy (electron of 27.5 GeV and proton of 920 GeV) data taking has been completed by lower proton beam energy periods at 460 GeV and 575 GeV. The total accumulated luminosity at high energy is close to 500 pb^{-1} .

The H1 detector dismantling has been finished during 2008.

Activities of the IIHE group

The main activities of the group, related to the VFPS project, can be divided in different topics:

- the study of the various proton beam parameters applied during the 2006–07 running period and their influence on the momentum measurement of the diffracted proton.
- the study of the VFPS acceptance and calibration. Reproducing the VFPS measurements by Monte Carlo using the proton beam spectrometer information is basic to any momentum reconstructed and cross section measurement. The shape of the acceptance is now well understood and the calibration, reaching a precision of 400 microns has still to be improved.
- The improved understanding of the VFPS detector and the beam optics benefit to the two analysis using the VFPS data. The first analysis, aiming the measurement of $F_2^{D(3)}$ structure function, shows that for given stable data taking periods, the simulation describes the data well.

The purpose of the second analysis, concerning the study of dijet events in deep inelastic scattering and in photo-production, is to shed further light on the factorisation breaking observed in photoproduction by measuring the 4-momentum transfer using the VFPS.

In parallel other data analyses are on going:

- study of Deeply Virtual Compton Scattering (PhD defended in Sept. 2008– B. Roland – ULB);
- study of rho and phi vector meson production (paper in prep.);
- photon elastic scattering at large momentum transfer (H1 publ. in 2008 and PhD defended in Sept. 2008 – T. Hreus – ULB);
- study of the hadronic final state (ongoing PhD).

During 2009, H1 published a total of 10 articles in international journals. The most important results are:

- QCD and jets

Using reduced proton beam energy data, a first direct measurement of the proton structure function F_L at low x has been achieved. The result is in agreement with QCD expectation.

Strangeness production and charm fragmentation in DIS has been measured with increased precision, as well as inclusive photoproduction of ρ^0 , K^{*0} and phi mesons.

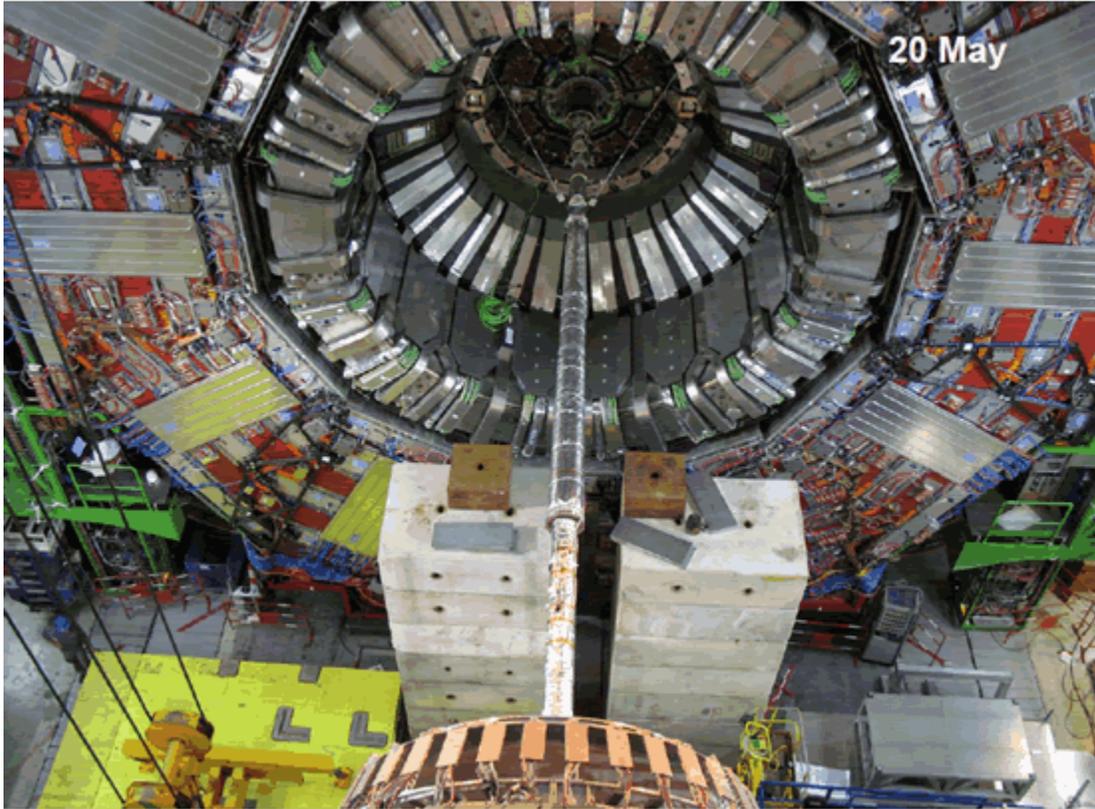
A first measurement of diffractive scattering of photons with large momentum has been performed, providing an important test of the BFKL evolution equations.

- Several results on searches have been published based on the full H1 statistics, they provide more restrictive limits on: excited neutrinos and excited electrons, multi-lepton production at high transverse momenta. Final results have been published on events with isolated leptons and missing transverse momentum and measurement of W production.

The excess of those events with respect to the Standard Model observed by H1 on the basis of HERA I data, has decreased with the use of the full HERA I+II data and is compatible with the Standard Model expectation. Also a analysis of general search for new phenomena has been published.

II.4 STUDY OF PP COLLISIONS AT LHC - THE CMS EXPERIMENT

(V. Adler, O. Bouhali, E. Chabert, O. Charaf, B. Clerbaux, G. De Lentdecker, V. Dero, O. Devroede, S. De Weirdt, J.P. Dewulf, J. D'Hondt, Sh. Elgammal, R. Goorens, G. Hammad, J. Heyninck, J. Maes, M. Mozer, P. Marage, S. Tavernier, C. Vander Velde, W. Van Doninck, P. Vanlaer, L. Van Lancker, P. Van Mulders, I. Villela, J. Wickens).



Installation of the beam pipe in CMS (minus-side).

During the year 2008, the Large Hadron Collider (LHC) has completed its construction phase. This machine, which will allow to study proton-proton interactions at a centre-of-mass energy of 14 TeV with luminosities around $10^{34} \text{cm}^{-2} \text{s}^{-1}$, is expected to start during the summer 2008. Two multipurpose detectors, ATLAS and CMS, are installed at the LHC.

A vast research program will be performed at this collider. The machine and detectors have been optimized for the search for new physics at high energy, with particular focus on the discovery of the Higgs boson(s) over a very large mass range. It will discriminate between different theories to extend the Standard Model, with, for example, the observation of supersymmetric particles or with manifestation of extra spatial dimensions. Studies of the top quark properties will become possible due to the large top pair production rate.

The Compact Muon Solenoid (CMS) collaboration consists of more than 2500 physicists and engineers from 176 institutes all over the world among which six Belgian research groups from the IIHE (ULB- VUB), UA, UCL, UGent and UMH. UGent joined the collaboration only recently and is participating to the construction of still missing RPC muon chambers. The five other Belgian teams have chosen already in 2000, to participate to the design and construction of the Silicon tracker detector of CMS.

The CMS experiment has been taking several runs to collect cosmic particles flying through the detector. This helps significantly in the commissioning and the alignments of the individual detectors. The data accumulated with these cosmic runs also gave the possibility to test the computing infrastructure and the offline workflows. In the first part of 2008 these cosmic runs

were taken when the magnetic field was off, the so-called CRUZET runs. Later in the year global runs with the full magnetic field of 3.8 Tesla were recorded, the so-called CRAFT runs.

In 2008, physicists from the IIHE participated to shifts during data taking with cosmic rays, at CERN. For these tests, 20% of the full tracker was used, allowing testing the full data taking and online monitoring chain. The tracker data obtained were of very high quality, demonstrating that it fully satisfies the specifications. In December, the full tracker was lowered to the experimental area, 100 m underground and inserted successfully into CMS.

Members of the IIHE have contributed to specific Data Quality Monitoring developments concerning the Silicon Strip Tracker. These offline tools were deployed for the first time during global runs collecting cosmic particles.

A member of the IIHE, Pascal Vanlaer, has taken an important responsibility in the convenorship of the CMS electron-photon working group in 2007 and 2008. In this framework, methods to validate the quality of electron tracks reconstruction from data rather than from simulation and robust algorithms to distinguish electrons from jets were developed.

On the 10th of September all journals and television news was focused towards the start-up of the LHC machine. On that day we succeeded in circulating protons in both directions in the collider. This is a milestone for the machine and opens the door to the exploration of Nature at the highest energy frontier. Also the Belgian press was omnipresent during these days. The Belgian labs have organized a successful press conference on this topic. The first proton beams gave also a splash of particles in the CMS detector.

During the 19th of September a severe accident happened however at the LHC. The electric connection between a dipole and a quadrupole experienced a short when increasing the current to about 9300 Amperes. Although safety systems are installed for these quenches, an electrical arc developed and punctured the helium enclosure, leading to release of helium into the insulation vacuum of the cryostat. The large pressure forces acting on the vacuum barriers caused displaced dipoles, in some cases even breaking the anchors in the concrete floor of the tunnel. This incident forces CERN to design a new schedule for the machine start-up and to invest more into a dedicated safety system. The new start-up of the machine is foreseen for September 2009.

In parallel, the CMS physicists of the IIHE continue to prepare the physics analyses. They contribute to the simulation studies of several physics channels of high relevance at the LHC. They participate to the development of the simulation and reconstruction programs which are required in order to perform the analyses. The two main physics topics are the search for high mass resonances decaying into electron or photon pairs and the study of the semi-leptonic decay of top-antitop quark pairs.

Jorgen D'Hondt, Sherif Elgammal, Joris Maes, Petra Van Mulders and Ilaria Vilella have been contributing to the facilities operations. On one hand they have contributed to debugging data transfers, monitoring data quality transfers between all CMS Tier sites. On the other hand they took part in the deployment of the CMS software (CMSSW) among all Tier sites.

Search for high mass resonances.

High mass resonances decaying into electron pairs provide some of the most important discovery potentials beyond the Standard Model at the LHC at energy of 10 and 14 TeV. They are predicted in various models as for example massive gravitons or new massive gauge bosons in the framework of extra spatial dimension models, as well as new heavy Z bosons in Grand Unified Theories. A discovery in the electron pair channel is possible for certain models even with low integrated luminosity available at start-up (of the order of several tens/hundreds of inverse picobarns).

Since a couple of years physicists of the IIHE in the CMS Collaboration play a leading role in the preparation of the physics analyses for the search of heavy resonances decaying into electron pairs. They initiated the creation of the HEEP (High Energy Electron Pairs) working group composed of about ten European and American institutes which meet regularly.

After a complete analysis of the CMS potential at high luminosity (up to 100 fb⁻¹) published in 2006 (CMS PTDR11), the HEEP group has defined the strategy to adopt with the very first data (low luminosity and not perfectly understood detector) to allow a fast discovery of high mass resonances in startup condition. In particular, the detector response to high energy

electrons will be tested by measuring the known Drell–Yan cross section in the dielectron decay channel, in a mass range where no new physics is present ($2000 < M < 800 \text{ GeV}/c^2$). Several CMS internal notes have been written on the subject in 2007. In 2008, the various pieces of the analysis in the startup conditions have been completed. The Brussels group has been heavily involved in every step of the analysis, detailed below.

In order to select online high energy electrons, three new trigger paths with different electron transverse momentum thresholds have been designed and tested. The detector response to high energy electromagnetic objects, typically of transverse momentum larger than $80 \text{ GeV}/c$ has been studied in detail in order to define the signal selection procedure. The selection is designed to have high efficiency (due to the expected small number of signal events), while rejecting most of the jet background, mainly thanks to electron identification and electron isolation criteria. Improvements of the measurement of very high energy electrons, by correcting for dead space in the detector and of crystals in the electromagnetic calorimeter electronics saturation, have been studied. An important work of the Brussels HEEP group was to define procedures to estimate, from the data themselves, the selection efficiency and the remaining background in the final sample, in order to be as much as possible Monte–Carlo simulation independent. For this purpose, several complementary methods have been designed and tested on the small statistics samples expected at start up. The main background comes from top–antitop production and from the W +jet process where a jet is misidentified as an electron. The expected statistical and systematic errors on the signal of high mass ($M > 200 \text{ GeV}/c^2$) Drell–Yan events has been studied. The CMS five–sigma discovery potential for heavy resonances as well as the 95% confidence limit on the resonance production cross section in case of the absence of signal has been estimated, showing a discovery potential for various new resonance production in CMS already at LHC startup. This work was the object of 7 CMS internal reports.

The HEEP group in Brussels has performed an analysis exercise, which has gathered all pieces of the HEEP high mass dielectron search (data access, electron identification, background measurement, signal extraction, limit settings), integrated them into a unified analysis. The exercise used Monte Carlo and has production which included the signal and all expected standard model processes. A pseudoexperiment corresponding to 100 pb^{-1} of integrated luminosity was performed.

The whole analysis study performed by the HEEP group during the years 2007 and 2008 has lead to 2 CMS publications and members of the group have presented 6 talks on CMS and LHC physics at conferences.

Study of top quark pairs.

The top quark is the heaviest particle within the Standard Model of particle physics. Due to its high mass it was only discovered in 1995 at the proton/anti–proton Tevatron collider (Chicago, U.S.). In the exploitation phase of the Large Hadron Collider millions of top quarks will be produced each year. These data will open a new window to precision measurements of the properties of the top quarks and their production mechanisms. With these measurements, the Standard Model will be tested at its frontier. Moreover, any deviation from the Standard Model predictions might reveal new physics, beyond the Standard Model.

The physicists from the IIHE aim to contribute to a precise determination of the top quark mass from semi–leptonic decaying top quark pair events, with a total uncertainty of $\sim 1 \text{ GeV}/c^2$ or better. This potential measurement would be the most precise measurement of this Standard Model parameter. They also plan to measure the top quark pair production cross–section and to study spin correlations through the study of angular distributions. New physics will be searched for by studying some topological and kinematical characteristics of the events. The first variable to be investigated will be the top–antitop invariant mass as the shape of its distribution is expected to be very little affected by the presence of remaining QCD background. The existence of a new massive particle like an additional gauge boson Z' would show up as a peak in such distribution. In the case of the two doublets Higgs model, the existence of a scalar Higgs boson might be revealed by a more general distortion of the invariant mass distribution.

But before tackling these exciting physics issues with the first data expected late in 2009, the reconstruction procedures, the event selection and the statistics analysis tools need to be built

and tested. The IIHE physicists worked on the implementation and testing of analyses which use few data, namely of about 10 to 100pb⁻¹ of integrated luminosity. A simplified event selection was designed for this early physics and a method was developed to estimate the background directly from the data. New ideas were developed to have all our analyses in a data driven format, which means that we redesign the analysis to have as little as possible dependence on Monte-Carlo simulations. This gives rise to new measurement methods to observe spin correlations between the top and anti-top quark and to new techniques to estimate the b-tagging efficiency. Currently we are testing the performance of these novel methods with Monte-Carlo simulation.

The year 2008 was also used to further investigate some crucial steps of future analyses. The strategy for the estimation of the jet energy scale corrections was refined. These corrections are based on Monte Carlo simulations tuned first on beam test data and later, when available, on collider data. They take into account offset corrections for pile-up, noise, and effects of thresholds, dependence of the calorimeter response to the jet pseudorapidity and transverse momentum, jet flavor and contribution of the underlying events. The method to estimate the efficiencies for tagging the b-quark, and c-quark jets from data has been further worked out. Event samples identified as semi-leptonic and fully-leptonic decays of the top-antitop pairs are used. Different techniques based on extraction of high purity b-flavored jets, or on requiring the consistency between the observed and expected numbers of tags in the events will be used to study the heavy flavor algorithms. These techniques can also be extended to measure the mis-tag rates for light quark jets in the future. The simulation of more QCD events showed that the foreseen cuts are not sufficient to reject this background; better cuts are being designed. A precise estimation of the QCD contribution is needed as the cross-section of this channel is huge compared to this of the top signal. As the QCD cross-section normalization is poorly predicted, a method to normalize it with data is being studied.

Finally, since December 2006 and for two years, Jorgen D'Hondt, is convenor of the group in charge of the physics analyses on the top quarks for the whole CMS collaboration.

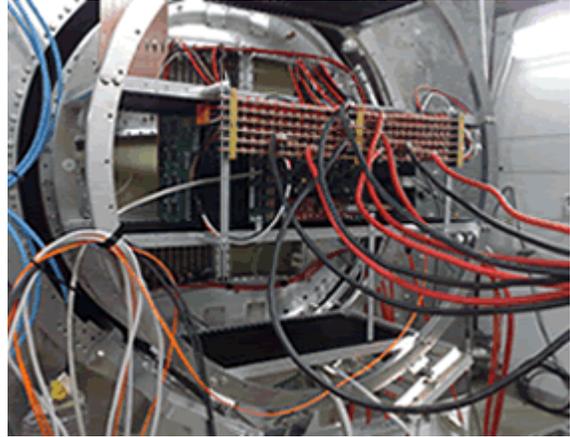
III. APPLIED R&D AND SPIN-OFF

III.1 DATA ACQUISITION R&D PROJECT

(D. Bertrand, G. De Lentdecker, J-P. Dewulf, X. Janssen, P. Marage, C. Vander Velde, Y. Yang)



TPC being introduced in the supraconducting magnet
TPC endplate.



Front-end electronics connected to the
TPC endplate.

Since 2007, a small group of physicists has started R&D activities in the field of data acquisition (DAQ) systems for future experiments in (astro-) particle physics. Modern technologies allow to design an DAQ architecture independent of the detector technology to which the DAQ system will be connected, providing freedom to the choice of this future experiment.

To conduct these developments in a concrete case, the laboratory started a collaboration with the University of Lund (Sweden) and CERN to develop the DAQ system for a large prototype of Time Projection Chamber (TPC) that could be installed at a future linear electron-positron collider (ILC or CLIC). This choice has been driven by the fact that the laboratory has a large expertise in the development of the DAQ system for the major experiments in (astro-) particle physics (DELPHI, H1, CMS, IceCube). In addition, the future linear collider projects plan to use the most advanced technologies from the telecommunication and the digital programmable electronic industries: the Advanced Telecom Computing Architecture (ATCA) standard and Field Programmable Gate Arrays (FPGA). These standards are also envisaged for the LHC upgrade, super-LHC. Consequently the experience that we are gaining by developing DAQ systems based on these standards will be a valuable asset for a probable participation of the IIHE in one of these future experiments.

The first DAQ prototype that we developed is now ready and is being tested since mid-February 2009 with a large TPC prototype exposed to a 6 GeV electron beam at DESY (Hamburg). This DAQ system is based on the DAQ of the ALICE experiment at LHC but it had to be modified for our needs. The modifications have been shared among the three institutes according to the expertise of each group. CERN developed a new front-end pre-amplifier and the University of Lund designed new front-end cards (FEC). Our contributions in the project are numerous:

- development of a new electronic card equipped with FPGAs to distribute synchronization signals to the FECs;
- programming of the FPGAs located on the FEC that control the front-end pre-amplifiers;
- in collaboration with the University of Lund and the University of Bonn, the development of the software to control and monitor the data acquisition.

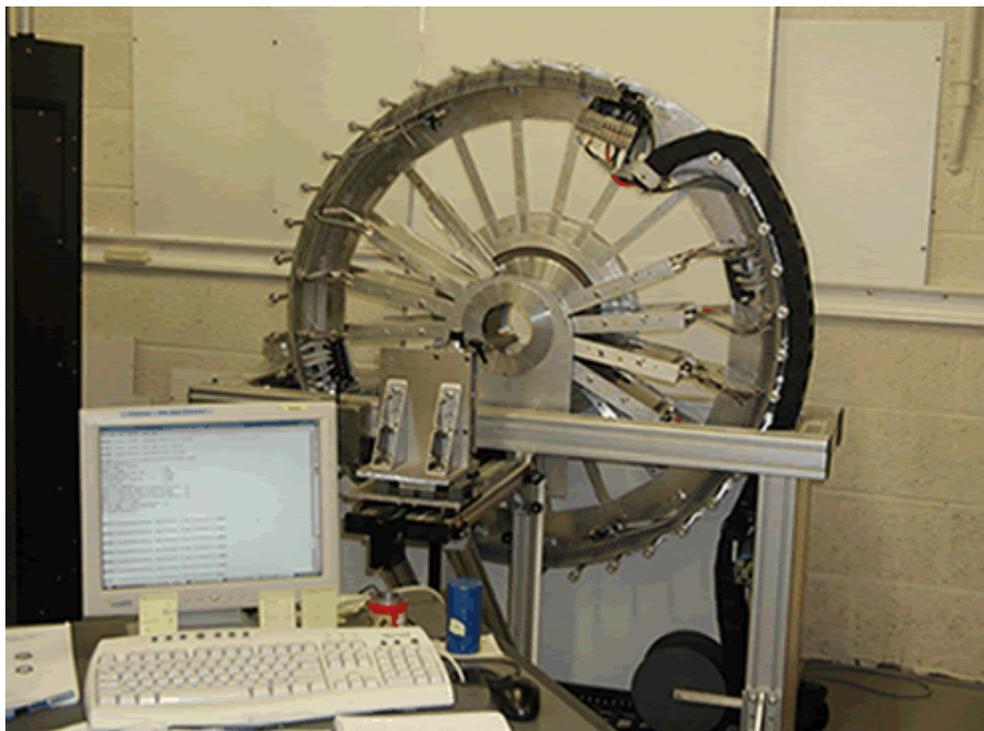
These developments have been performed within the EUDET project supported by the European Union in the 6th Framework Program. EUDET has as objectives to create infrastructures to support the R&D programs for the future linear collider. In 2008, EUDET has identified the

development of DAQ systems as a key component to setup these facilities, namely the design of a DAQ system common to various detectors that have to be tested together with beams.

At the end of the current test beam campaign with the large TPC prototype at DESY, end of 2009, the laboratory will improve the DAQ prototype, including components of the new ATCA standard to make it more flexible and easily adaptable to other detector technologies and other experiments.

III.2 DEVELOPMENT OF NEW SCINTILLATION MATERIALS AND OF RADIATION DETECTORS FOR BIOMEDICAL IMAGING APPLICATIONS - THE CRYSTAL CLEAR PROJECT.

(P. Bruyndonckx, Dang Jun, O. Devroede, C. Lemaître, Li Zhi, S. Tavernier, M. Wedrowski, E. Wieers, N. Pereira)



Prototype van een PET scanner voor kleine proefdieren ontworpen en gebouwd aan de VUB in samenwerking met Forschungszentrum Jülich.

At the front line of organic research, molecular and cellular biologists engineer new molecular arrangements, including genes and proteins. Having produced these new strains, the next task is to investigate what happens when they are implanted in living tissue. The researchers want to know how the new genes "express" themselves. In a different area – pharmaceutical research – the effects of potential new drugs have to be established as quickly as possible. In the past, results have been established "in vitro", by either killing the samples or by taking biopsies. Until recently, there has been no other way of studying the effects of genetic manipulation or drug administration. Now researchers have found how imaging techniques used in medical diagnosis can be adapted for genetic or drug research, providing an immediate picture of how the modified tissue behaves "in vivo". One of these techniques is Positron Emission Tomography (PET).

Since a few years there has also been a steadily growing interest in using PET for mammography studies. Existing clinical PET systems are not optimized for this application, and the development of dedicated Positron Emission Mammography (PEM) scanners, which are specifically designed and optimized for the task at hand, is required.

From its inception, PET technology has continually benefited from new developments in radiation detection for fundamental research in high energy physics, first using sodium iodide crystals, then using the improved performance from bismuth germinate (BGO), and more recently using superior materials such as lutetium orthosilicate or lutetium aluminates. These new scintillators are faster and produce more light than BGO. The arrival of more advanced position sensitive PMTs (PS-PMTs), Avalanche photo diodes (APDs) or Silicon PMTs make it possible to read out matrices of small crystals individually without the introduction of excessive dead space.

In the framework of the Crystal Clear Collaboration (CCC), the medical instrumentation group of the IIHE, together with the UGent, CERN, the Université Claude Bernard (Lyon) and the Forschungszentrum Juelich has developed a new generation of high-resolution small animal PET scanners : the ClearPET. The design of these small animal PET scanners is based on the use of position sensitive PMTs (PSPMT) and a phoswich of LSO/LuYAP scintillators to provide the depth of interaction information. The IIHE research group was responsible for the design and construction of the front-end detector modules for a number of small animal PET systems developed within the collaboration. These detector modules consist of a double layered 8x8 crystal matrix mounted on a position sensitive PMT. The upper layer contains 64 LSO crystals measuring 2x2x8 mm while the bottom layer consists of 64 LuYAP crystals measuring 2x2x8 mm. A first system was installed at Ugent three years ago.

To check the sensitivity performance of the system along the scanner axis, a detailed Monte Carlo simulation was developed using GATE (Geant4 Application for Tomographic Emission). In addition to all the physical phenomena occurring in the detection processing, the data acquisition electronics has been modelled to also include effects such as dead time, event buffering, energy threshold blurring, data transfer rates, etc.

A second ClearPET system is now installed in the IIHE. This system will have a larger number of detector modules and longer scintillation crystals to enhance the overall sensitivity. In addition a number of mechanical changes have been made to improve the stability of the scanner and enhance the mounting accuracy of the detector modules.

In preparation for the design and construction of a new generation BrainPET scanners, studies using Avalanche Photo diodes (APD) are performed. APDs are more compact, are more easily subdivided in small pixels, and are potentially lower in cost. In these prototype detector modules, very small individual crystals are replaced by solid scintillator blocks to eliminate dead zones in-between the crystals. In addition, these scintillator blocks are less expensive to produce and easier to mount. The position and depth of interaction is determined from the light distribution measured over the pixels in the APD array. The information is extracted from the light profile using neural networks, support vector machines or statistically based methods. The performance of these detector configurations for tomographic imaging can be evaluated on a hardware simulator. This device consists of two rotating platforms onto which two detector modules can be mounted. The two platforms can rotate over 360° and the modules can also rotate relative to one another. This allows us to simulate a complete (or partial) detector ring and reconstruct tomographic images of an object. The resulting image shows the very encouraging resolution of 1.6 mm FWHM.

The statistical learning algorithms used to find the photon incidence position need to be trained before they can be used. An in-situ position calibration procedure has been developed which allows a fully automatic collection of a training data sets for all detector modules in a fully assembled PET system.

The BrainPET project is a joined effort of de VUB team in collaboration with CIEMAT (Madrid, Spain) and Forschungszentrum Julich (FZJ, Germany). The basic detector modules will consist of a dual layer of trapezoidal LSO blocks. The complete system will consist of 4 detector rings, each with 52 detector modules. To determine the optimal design parameters of the detector modules, extensive simulations using the GATE, a GEANT based Monte Carlo package, were performed. This allowed us to estimate the impact of many parameters such as the crystal thicknesses, training data pattern to be recorded, electronic noise level and digitization accuracy, APD gain, position of the APDs on the LSO blocks, scattering in photo detectors and electronics very close to the scintillators, ...etc. The final parameters of the BrainPET system that will be developed by the collaboration were determined on the basis of this study.

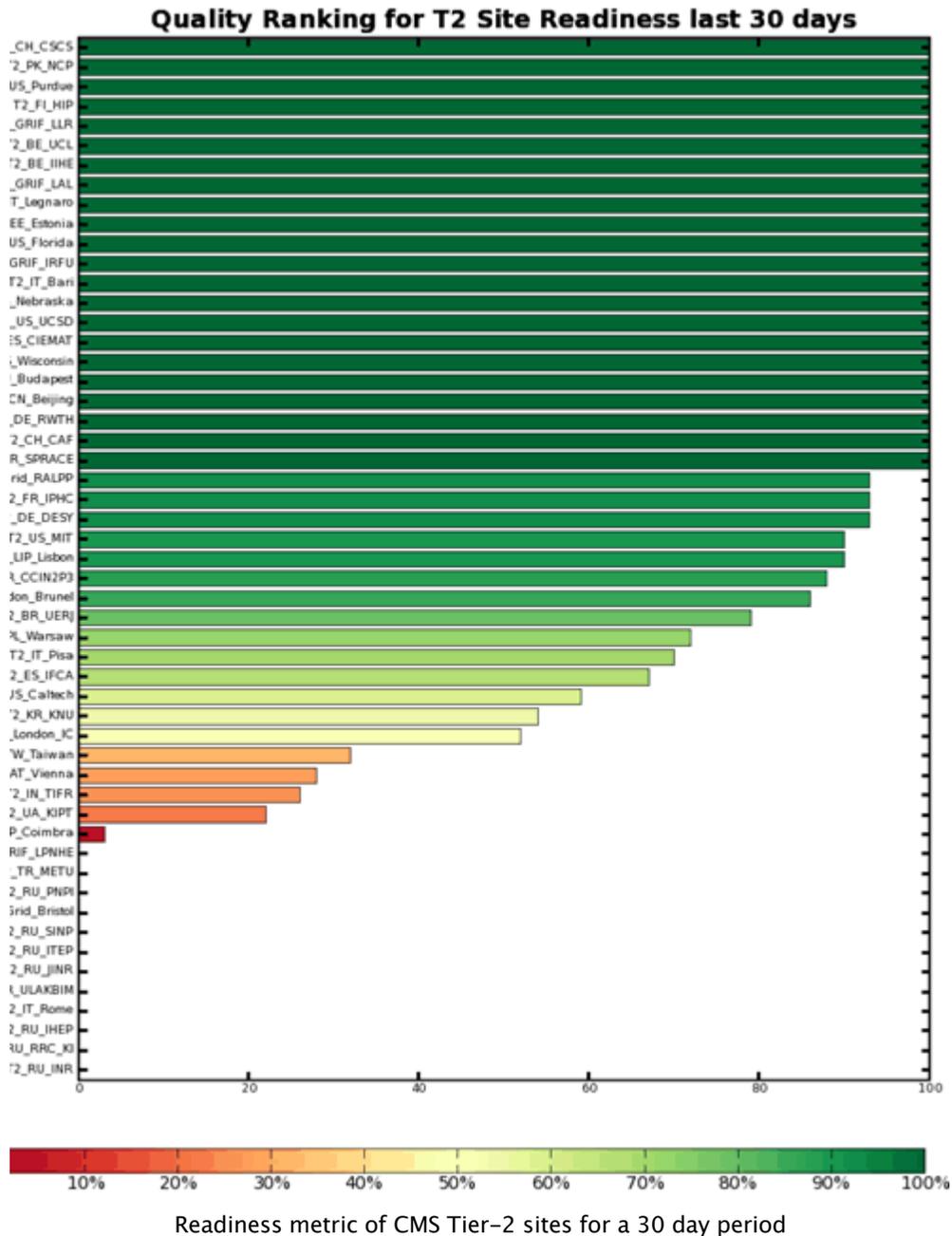
One of the conclusions of our study was that the spatial resolution is mainly limited by the signal-to-noise ratio (SNR) of the APD signals. The SNR suffers from the low APD gain and high excess noise factor. The newly developed silicon PMTs allow a much larger gain and therefore could significantly improve the resolution that can be achieved with such a system.

Our research group is also involved in the development of a second generation of the ClearPEM prototypes. These are dedicated PET scanners for mammographic breast imaging. In this second generation, an ultra-sound (US) probe will be added to complement to mammographic PET studies with anatomical information. Our contribution will be the study of algorithms to fuse the PET and US images, overlaying the anatomical features with the

corresponding molecular signatures of the cancer process. In order to develop and test appropriate algorithm, a suitable phantom has to be developed that can be used for both the PET and US imaging modelity. In collaboration with the Laboratoire de mécanique et d'acoustique of the CNRS in Marseille, several material mixtures have been tested for their ultra-sonic properties (speed of sound, attenuation of sound waves, absence of shear waves,..) and compared with those found in real human breast tissue. This will now be further developed in a jelly-based, breast-shaped phantom, including small spheres representing tumors, that can be injected with radio tracers.

IV. COMPUTING AND NETWORKING

(D. Bertrand, O. Bouhali, S. De Weirdt, G. Rousseau, S. Rugovac, S. Tavernier, E. Torisaen, P. Vanlaer, R. Vandenbroucke, D. Vijverman)



The management of the IIHE computing team is under the responsibility of O. Bouhali. This covers the following tasks:

- Coordinating the work of the computing team;
- Follow-up of the maintenance and insurance contacts;
- Planning for hardware and software upgrade;
- Providing support for Linux users;

- Co-representing the IIHE in grid related projects;
- Organizing regular meetings with the users.

A. IIHE PERSONNEL

On September 2008, A. Ouchene joined the IIHE support team from to bring additional Linux support to the users. O. Bouhali is on leave for absence since the 15th of October 2008 and G. Rousseau has retired at the end of 2008 after 35 years of devoted work.

B. LOCAL CLUSTERS

The local computing facility has been reinforced and consists of:

- A cluster composed of 180 cores after the addition of 13 computer nodes of 8 cores (SUN Microsystems x2200). This gives a total processing power of more than 200 GFLOPS and a 300 GB total RAM. This cluster is running Condor as resource manager and scheduler. It is used by the AMANDA/IceCube and PET physicists for their analysis.
- A new cluster server consisting of 8 cores, 16 GB of RAM and 1 TB of hard disk space is providing the management of the cluster. It has a 4 Gbps connection to Ethernet.

The local storage facility is composed of:

- A SAN of type MA8000 with a raw capacity of 3 TB (RAID5);
- A SAN of type MSA1500 with a raw capacity of 7.2 TB (RAID5);
- A new Sun Microsystem x4500 storage system with a raw capacity of 36 TB connected to Ethernet through a 4Gpbs line.

C. GRID COMPUTING

Grid computing is the ultimate solution for the storage and the analysis of the enormous data that is (will be) produced by the different experiments. The IIHE computing groups is involved in several national and international grid projects.

BEGRID

The BEgrid project started in 2003 in collaboration with the Belgian Research computing network BELNET. A cluster of about 200 processors is administrated together with the CMS Tier-2 (see below) and made available to Begrid users. In addition to supporting CMS analyses, the IIHE IT team offers support for Begrid users from ULB and VUB and is involved into various international projects:

- Tutorials and training sessions for grid users;
- The test and integration of the European EGEE grid middleware;
- The collaboration with Moroccan scientists to promote grid technologies in this country. A first grid platform has been deployed and a certification authority has been established. Several Master theses have been commonly conducted;
- The involvement in EumedGrid activities through the collaboration with Morocco. EumedGrid is an EGEE initiative to build a pilot grid platform for research across the Mediterranean.

The IIHE grid activities have lead to 1 publication, 2 conference presentations and to 1 Master thesis in 2008.

CMS TIER-2

In 2008 the IIHE further deployed the Belgian “Tier-2” cluster integrated in the hierarchy of computing centers that will process the data of the CMS experiment. The Belgian “Tier-2” is a federation of 2 sites, one in Brussels and one in Louvain-la-Neuve. The Brussels site hosts the contributions of the UA, UGent, UMH, ULB and VUB in computing power and disks. Those are funded by the F.R.S.-FNRS and by the FWO-Flemish Community. It is meant to support the analyses of the Belgian CMS physicists, ~50 people from both French-speaking and Flemish universities, in collaboration with the UCL site.

A very important step of this deployment materialized in 2008. The cluster migrated from its location at the IIHE to the infrastructures of the ULB-VUB computing center, according to an agreement that was negotiated in 2007. The cluster now benefits from:

- a reliable, large-bandwidth connection (1 Gb/s) to the GEANT research network;
- common air conditioning and electric power network allowing to save costs.

Three full-time IT scientists (S.Rugovac – F.R.S.-FNRS, O.Devroede – FWO, S.G rard – ULB) are currently in charge of the Tier-2 deployment and user support. The physicist in charge and representative to the W-LCG and CMS computing boards is P.Vanlaer. S.G rard could be hired on a temporary position in replacement for O.Bouhali, on leave of absence from ULB for an executive position to deploy a cluster in the Doha Education City (Qatar). O. Devroede is now the technical coordinator of the Belgian Tier-2, and has replaced S.De Weirdt, who left us for an executive position at the Vlaams Supercomputing Center.

The disk storage of the IIHE Tier-2 was extended by 170 TB, reaching 260 TB of storage. This disk space is meant to host data samples of three kinds: 1) general interest to the CMS collaboration, 2) samples for CMS physics analysis groups and 3) samples for the analyses performed in Belgium, each for about one third of the disk space.

The computing power was extended in 2008 by 7 Supermicro Twin servers (14 nodes x 2 CPUs per node x 4 cores per CPU = 112 cores) for an equivalent of 140 kSi2K. The second extension foreseen in November was postponed to 2009. The delays due to the LHC incident allowed the spendings in computing power to be postponed for a better performance-to-cost ratio. The IIHE Tier-2, however, benefits from general-purpose computing power installed in the framework of the BELNET grid project, Begrid. The total number of processing power available at the IIHE Tier-2 is currently 500 kSi2K, 300 of which being funded on CMS budget. The IIHE site offers 340 batch slots for CMS simulation and analysis jobs.

As all CMS Tier-2 sites, the IIHE site is tested daily by CMS for its availability, its reliability and the number of links to other sites that are operational. The results of these tests are combined into a readiness metric. According to this metric, the IIHE site is among the top 10 most ready sites in the Collaboration in March 2009 (last month of data – See figure). The reproducibility of this good performance has still to be consolidated in view of the LHC data taking period.

V. THE INTER-UNIVERSITY ATTRACTION POLE (IAP) IN FUNDAMENTAL INTERACTIONS

The IIHE (ULB-VUB) was part of the IAP 5/27 "Fundamental Interactions: at the boundary of theory, phenomenology and experiment" from 2002 until 2006. The IAP is now funded for another period (IAP 6/11) and has been extended (www.f-i.be) over the years 2007 to 2011. The members of the network are: Theoretische Fysica (KUL), Elementaire Deeltjes Fysica (UA), Centre de Physique des Particules et de Phénoménologie (CP3-UCL), Physique des Particules Élémentaires, Physique Mathématique des Interactions Fondamentales and Physique Théorique (ULB), Elementaire Deeltjesfysica and Theoretische Natuurkunde (VUB), Experimentele Deeltjesfysica (UGent), Physique Théorique Fondamentale (ULg).

The purpose of this IAP is to improve our understanding of Fundamental Interactions through a closer collaboration between Belgian research teams engaged in theoretical or experimental investigations in the field. We had in 2008 two general meetings where the activities of all the teams were presented. Moreover, the physicists of the IIHE participated actively to common seminars and journal clubs. They also contributed to the working group dedicated to the elaboration of future experiments to which the members of the network could participate during the second half of this decade.

VI. TECHNICAL AND ADMINISTRATIVE WORK

The members of the workshop staff in 2008 were: J. De Bruyne, P. de Harenne, J.-P. Dewulf, L. Etienne, R. Goorens, S. Hannaert, G. Van Beek, R. Vanderhaeghen, L. Van Lancker, Ch. Wastiels and Yang Yifan, with the help of A. De Coster, M. Goeman and D. Pirnay. D. Bertrand was in charge of the general coordination.

L. Van Lancker has the general responsibility of the design and of the assembly process of carbon fiber frames which will support the silicon detector of the forward CMS tracker. He is also responsible of the future RPC assembly project in Belgium. P. de Harenne and S. Hannaert participated to the final assembly of the CMS detector at CERN.

G. Van Beek is responsible for the mechanics of the scintillator strips target tracker modules for OPERA. His contributions include R/D on tracker design. He is co-responsible for the trackers installation on the OPERA detector and has contributed to the conception of the procedure used for their survey. P. de Harenne participated to the emulsion bricks assembly at the LNGS. S. Hannaert has contributed to OPERA through the fabrication of mechanical parts.

J.-P. Dewulf is responsible for the development of a test DAQ system for a new TPC in the framework of the preparation of new detectors for future experiments. He is involved in the design of a FPGA based board. During the last months of 2008 he worked closely with Yang Yifang who will take the project over after his retirement.

L. Etienne is responsible of the installation of the test station for the DOM modules (Digital Optical Modules) of the IceCube experiment. He also redeployed, after their move to a new room, the test stations of the AMANDA modules which were used for practical works of undergraduate students in physics.

J- P. Dewulf and L. Etienne were in charge of the design and the realization of a new data acquisition system for a cosmic ray experiment to be implemented in secondary schools (OCRE-KOSMIS). This system was considerably upgraded during 2007. L. Etienne was in charge of the preparation of the scintillators used in the experiment. G. Van Beek and L. Etienne are designing a new experiment to measure cosmic rays angular distribution and Cherenkov rings produced by muons dedicated to the practical work of undergraduated students in physics.

In the framework of the spin-off activities related to detector developments for medical applications, J. De Bruyne and Ch. Wastiels were in charge of the technical support of the CRYSTAL CLEAR project. More particularly Ch. Wastiels maintained electronics control cards for the small PET camera.

R. Goorens took part in the organisation of the ULB master classes.

The secretarial work and the general administrative and logistic support of the experiments were accomplished by D. Peymans, R. Alluyn who after her retirement was replaced by M. Goeman. They were working in collaboration with A. De Coster and D. Pirnay. D. Peymans took part in the organization of the ULB master classes. A. De Coster was responsible of the library of the Institute. She also maintains the database of the physicists publications. D. Pirnay maintained the IAP website. She had the responsibility of the organisation of the ASPERA national day and roadmap meetings which took place at Brussels in February and September 2008. She was helped by A. De Coster, M. Goeman and D. Peymans to welcome the participants. M. Goeman was in charge of the logistic support of the CRYSTAL CLEAR project. She participated to the organisation of the CERN school of physics which took place at Herbeumont in June 2008.

VII. REPRESENTATION IN ACADEMIC COUNCILS AND COMMITTEES

Daniel Bertrand

Member Doctoral and DEA Commission of the Physics Department
Chairman "ULB Personnel C4 Commission"
Responsible for the ULB Physics Department Erasmus Students Exchange Program

Catherine De Clercq

Member BaMa commissie faculteit Wetenschappen VUB
Secretary Examencommissie Bachelor Fysica
Secretary Examencommissie Master Fysica VUB
Member Werkgroep rationalisatie Master Fysica VUB
Member Facultaire selectiecommissie aanstelling P. Van Mechelen (UAntwerpen)
Member Commission Facultaire poste academique Physique Experimentale des Particules Elementaires.

Olivier Devroede

Member PR "Commissie Wetenschappen"

Eddi De Wolf

Member Research Council

Jorgen DHondt

representative departement Doctoraatsopleiding faculteit Wetenschappen
Vice-president Departement Fysica VUB

Pierre Marage

President of the "Commission scientifique Ecole doctorale de la Communauté française en Physique et Astrophysique"
Member of the "Conseil d' Institut national des Radioéléments, Fleurus"
President of the "Comité scientifique Inforsciences, cellule de diffusion des sciences de la Faculté des Sciences de l'ULB"

Stefaan Tavernier

Member of the "Bevorderingscommissie ZAP"

Catherine Vander Velde

Member of the Commission "d'attribution des crédits pédagogiques du département de physique"
Member of the Commission "de sélection des assistants du département de physique"
Representing the Dean of the Science Faculty Coordination "des Actions Pédagogiques (CAP) "

Nick Van Remortel

Member of the "Facultaire onderzoeksgroep website en mediatisering"

VIII. REPRESENTATION IN SCIENTIFIC COUNCILS AND COMMITTEES

Daniel Bertrand

Representing Member of the FNRS Aspera Steering Committee
Representing Member of the FNRS ApPEC Steering Committee
Representing Member of the FNRS DESY Experiments Finance Review Board
Representing Member of the FNRS ILIAS Steering Committee
Member of the C4 commission on Cosmic Rays of the International Union of Pure and Applied Physics (IUPAP)

Member IIHE CERN fellows Belgian selection committee
Member IIHE IAP governing board

Catherine De Clercq

Member Facultaire selectiecommissie aanstelling P. Van Mechelen (UAntwerpen)
Member Commission Facultaire poste académique Physique Expérimentale des Particules
Elémentaires
Member FWO commissie E5 Subatomaire Fysica
Member IISN commission des Hautes et Basses Energies
Member NIKHEF Scientific Advisory Committee
Vice-president board of the IAP 6/11 Fundamental Interactions
Member representant of FWO ASPERA Eranet Governing Board
Member Belgian selection committee of CERN fellows
Member organisation committee of the Belgian-Dutch-German summer school
Member representant of Belgium Plenary ECFA
Member representant of the FWO ApPEC steering committee
Member organisation of the 2008 CERN HEP school

Gilles De Lentdecker

Member ULB representative Belgian Physical Society
Member ULB representative Organizing Committee of the 42nd International Physics Olympiad,
July 2011, Belgium

Eddi De Wolf

Member FWO Ledencommissie

Jorgen D'Hondt

member International advisory board for TOP 2008
member IUAP Future experiments workgroup

Pierre Marage

Membre titulaire Comite national de Logique, de Philosophie et d
Member FWO – Commissie E5 (Subatomaire Fysica)
Member SPSC – CERN
Co-organiser Seminaire Ilya Prigogine Penser la Science, ULB
Co-organiser Ecole d ete Penser l evolution, Penser la science, ULB
Co-organiser Young Researchers Days en Logique, Philosophie et Histoire des Sciences,
Bruxelles

Catherine Vander Velde

Member Plenary European Committee of Future Accelerator (PECFA)

Walter Van Doninck

Member EPS HEPP Board

Gaston Wilquet

Member of the Commission des Hautes et Basses Energies, IISN-FNRS

IX. TEACHING ACTIVITIES – ACADEMIC YEAR 2007–2008

Daniel Bertrand

PHYS 105 "Stage de laboratoire" (0/0/75/0) 1ere licence en sciences physiques Full time
PHYS-F-205 "Physique 2" (36/0/0/0) BA2 Biology/Geography/Geology Full time

Peter Bruyndonckx

"Medische fysica" (13/13/0/0) BA3 Full time

Catherine De Clercq

WE-DNTK-9246 "Meten en Experimenteren" (responsible - 0/0/65) BA1 Fysica VUB Full time,
WE-DNTK-1998 "Elementaire Deeltjesfysica I" (26/0/26/0) BA3 Fysica VUB Full time,
WE-DNTK-12521 "Astroparticle physics" (13/13/0/0) Master fysica VUB Full time,
WE-DNTK-12525 "Beyond the Standard Model" (coordination) Master fysica VUB Part time.

Gilles De Lentdecker

PHYS-F-305 "Laboratoire de physique des particules" (0/0/0/32) BA3 Full time
PHYS-F-205 "Physique 2" (0/0/0/24) BA2 Full time

Olbren Depaepe

WE-DNTK-1987 "Proefondervindelijke aspecten van de stralings- en kwantumfysica"
(0/0/0/28) BA2 Part time

Vincent Dero

PHYS-F-301 "Techniques de la Physique Expérimentale" (0/0/40/0) BA3 Part time

Olivier Devroede

"Informatica (modula 2)" (0/30/0/10) BA1 Full time
"Informatica (C++)" (0/30/0/10) BA3 Full time
"Computervaardigheden" (10/10/0/30) MA1 Full time
"Mathematica" (2/4/0/12) BA1 Full time

Eddy De Wolf

2BPHYS-07 "Kanstheorie en Statistiek" (30/30) BA2 Full time
MFYS1009 "Theorie van de Fundamentele Wisselwerkingen" (3/30) MA1 Full time

Jorgen D'Hondt

"Statistiek voor fysici" (13 HOC / 13 WPO) BA1 Full time
"Statistische verwerking van experimentele gegevens" (13 HOC / 13 WPO) BA2 Full time
"Statistische Fysica en Thermodynamica" (26 HOC / 26 WPO) BA3 Full time
"Gevordeerde data analyse" (15 HOC / 10 WPO) MA2 Full time
"Capita Selecta van de deeltjesfysica" (26 HOC / 26 WPO) MA1 Full time
"Proefondervindelijke aspecten van stralings- en quantumfysica" (10 HOC / 50 WPO) BA2 Full time

Laurent Favart

PHYS-F-477 "Physique auprès des collisionneurs hadroniques" (24/0/0/12) MA1 Full time

Xavier Janssen

PHYS-F-205 "Physique 2 - Travaux pratiques en laboratoire" (24) BA2 BIO and BA2 GEO2 Full time.

Joris Maes

WE-DNTK-9246 "Meten en experimenteren" (0/0/40/40) BA1 Full time
WE-DNTK-11357 "Statistische verwerking van experimentele gegevens" (0/0/13/13) BA2 Full time

Pierre Marage

HIST-F-101 "Histoire des Sciences" (24/0/0/0) BA1 Full time
PHYS-F-104 "Physique generale" (48/0/0/20) BA1 Full time
HIST-F-500 "Histoire des Sciences et Epistémologie" (24/0/0/0) MA-didact., AESS Full time

Matthias Mozer

"Statistische fysica en thermodynamica (Prof. J. D'Hondt)" ((0/26/0/0)) BA3 Part time

Robert Roosen

VUB13949 "Geschiedenis van de natuurkunde" (15/0/0/15) 2008 Part time
WE-dntk-9327 "Elementaire Deeltjes fysica II" (20/0/0/20) 2008 Part time

Stefaan Tavernier

BNEN "Radiation protection and nuclear measurement" (12+12) Interuniversitaire
Masteropleiding in Nuclear Engineering Full time
WE-DNTK-2088 "Kernfysica en toepassingen" (13/13) BA3 Full time
IR--12405 "Measurement techniques in nuclear and particle physics" (16/0/16/0) MA1
Biomedical engineering (UGent-VUB) Full time
WE-DNTK-12516 "Moderne instrumentatie in de fysica" (26/0/0/26) MA1 Fysica Full time

Catherine Vander Velde

PEDA-F-501 "Pratique réflexive (physique)" (0/24) AESS + MA1 physique Full time
PHYS-F-510 "Didactique de la physique (du secondaire et du supérieur)" (36/0/0/12) AESS +
MA1 physique Full time
PHYS-F-443 "Travaux pratiques et stages" (0/0/12/36) AESS + MA1 physique Full time
PHYS-F-511 "Travaux pratiques et stages" (0/0/0/36) AESS + MA2 physique Full time
PHYS-F-103 "Physique" (36/0/0/20) BA1-Informatique Full time
Coordinator "Objectif réussite - physique" (40) BA1-toutes sections Full time

Walter Van Doninck

ELEM II "The Standard Model" (15 hours) 2008 Part time

Pascal Vanlaer

PHYS-J-102 "Physique Generale" (0/0/36/0) BA1 Full time
PHYS-F-101 "Physique Generale" (0/48/0/0) BA1 Full time
PHYS-F-301 "Techniques de la Physique Experimentale" (24/0/36/0) BA3 Full time
PHYS-F-437 "Etude du bruit de fond tbar pour la recherche du Z"
PHYS-F-436 "Recherche du Z' dans CMS"

Pierre Van Mechelen

2BFYS-02 "Algemene Fysica IV: Relativiteit en Deeltjesfysica" (30/30/0/0) BA2 Full time
GLNATU01A10141 "Subatomaire Fysica" (15/15/0/0) BA3 Full time
MFYS2024 "Versnellerfysica" (25/0/0/5) MA2 Full time

Petra Van Mulders

WE-DNTK-9246 "Meten en experimenteren" (0/0/40/40) BA1 Full time
WE-DNTK-12058 "Statistiek voor fysici" (0/13/0/30) BA1 Full time

Nick Van Remortel

2BFYS-08 "Informatica II" (20/0/30/10) BA2 Full time
2BFYS-11 "Elektronica" (15/0/15/15) BA2 Full time
MFYS20041 "Project computer-simulatietechnieken" (5/0/0/25) Master Full time
MFYS2012 "Computergestuurde Experimenten en Data Acquisitie" (15/0/15/10) Master Full
time

Pierre Vilain

PHYS-F-305 "Physique des particules élémentaires" (24/0/0/12) BA3 Full time
PHYS-F-416 "Interactions fondamentales et particules" (16/0/0/0) MA1 Full time

Mateusz Wedrowski

"Kernfysica en toepassingen" (0/13/0/0) BA3 Phys Full time

"Nucleaire meettechniek" (0/13/0/0) MA1 Biomedical Engineering, MA1 UA Full time

Gaston Wilquet

PHYS-F-301 "Techniques de la physique experimentale" (14/90/0) PHYS – BA3 Full time

PHYS-F-312/313 "Coordination des travaux de laboratoires" (0/90/0) PHYS – BA3 Full time

PHYS-F-310/311 "Coordination des stages" (0/90/0) PHYS – BA3 Full time

X. PHD THESES COMPLETED IN 2008

Jan Heyninck

PhD Defense Vrije Universiteit Brussel "Potential for Top Quark physics with the CMS detector at the LHC" 11/4/2008 Promotor: Jorgen D'Hondt

Tomas Hreus

"Studies of Diffractive Scattering of Photons at Large Momentum Transfer and of the VFPS Detector at"

26/09/2008 – Promotor: Laurent Favart, Jozef Urban

Benoît Roland

"Measurement of the Deeply Virtual Compton Scattering at HERA II" 22/09/2008

Promotor: Laurent Favart (ULB)

XI. SEMINARS AND ORAL PRESENTATIONS AT CONFERENCES, SCHOOLS AND COLLABORATION MEETINGS

XI.1 SEMINARS AT THE IIHE (ORGANISED BY L. FAVART)

New tools in jet physics: SIScone (a new cone algorithm) and jet areas (a new concept) – Gregory Soyez (ULg/BNL) ,18/2/2008

The low energy side of IceCube – Andreas Gross (Max Planck Inst. – Heidelberg) 4/4/2008

DAQ system upgrade of the BESIII experiment at the BEPCII e^+e^- collider – Yang YiFan (Institute of High Energy Physics, CAS, Beijing) 24/4/2008

Search for New Physics in Electron-Positron Events at CDF – Sam Harper (Oxford University) 9/5/2008

The Beijing Spectrometer III Experiment – Status and Physics Program – Niklaus Berger (IHEP, Beijing), 23/5/2008

Search for new physics in top pair mass spectrum distributions at CMS – Eric Chabert (IPNL, Lyon, France), 6/6/2008

Detecting neutrinos from Gamma-Ray Bursts with IceCube – Dr. Garnt de Vries-Uiterweerd (Universiteit Utrecht), 28/7/2008

High precision measurement of the strong coupling constant α_s with high p_T jets in DIS – Maxime Gouzevitch (Ecole Polytechnique, Paris), 4/9/2008

The Relativistic Corrections of Exclusive and Inclusive J/psi production at B-factories and QCD correction of D-wave Quarkonium Decay – Zhiguo He (Peking Univ.), 5/11/2008

High energy scattering processes in QCD – Dr. Francesco Caporale (Universita della Calabria, Italy), 13/11/2008

Signals from the Universe: from DAMA/NaI to DAMA/LIBRA – Dr. Pierluigi Belli (Roma), 14/11/2008

Towards the start-up of CMS detector – Stephanie Beauceron (CERN), 25/11/2008

XI.2 SEMINARS

Laurent Favart

(Diffraction 2008 – La Londe–les–Maures, France):"Vector meson production at HERA"
10/09/2008

Gregory Hammad

"Recherche de nouvelles physiques dans les processus de créations de paires de quarks top" –
Saint Flour, Cantal, France, 02/12/2008

Xavier Janssen

(IIHE):"IIHE DAQ activities for test beams of the TPC large prototype" 18/11/2008

Pierre Marage

"L'Evolution est-elle moins scientifique que la mécanique quantique ?" – Exposé à l'Ecole d'Etat
"Penser l'Evolution", ULB 25–27/08/2008
"Rapports entre sciences et religions" –Formation sur la "neutralité", AESS, ULB25/08/08

Stefaan Tavernier

"Intellectual property (IP) in the Crystal Clear Collaboration"– Dresden, Germany, 24/10/2008

Walter Van Doninck

"Capita Selecta uit de Experimentele Deeltjesfysica" – Koninklijke Vlaamse Academie van België
voor Wetenschappen en Kunsten, 03/008

XI.3 ORAL PRESENTATIONS AT CONFERENCES, SCHOOLS

Volker Adler

"SiStrip DQM Status – Readiness for CRAFT" – CERN, Geneva, Switzerland 09/10/2008
"Needs and tools for trigger studies in the physics analysis" – CERN, Geneva, Switzerland
19/09/2008

Marco Cardaci

"Searches using Dijet Events at the LHC" – La Thuile, Italy 10/03/2008

Barbara Clerbaux

"Lecture on physics beyond the Standard Model, Joint Belgian – Dutch – German School, Texel,
The Netherlands 23–24/09/2008

Jun Dang

"Clear PEM–Sonic collaboration meeting" – Marseille,France 10/12/2008

Catherine De Clercq

"Search for Dark Matter with the AMANDA and IceCube neutrino telescopes" – PANIC08
conference, Eilat, Israel 10/11/2008
"Search for Dark Matter with the AMANDA and IceCube neutrino detectors" – IDM2008
conference, Stockholm, Sweden 22/08/2008
"Particle and Astroparticle Physics in Belgium" – ASPERA Belgian National Day, Brussels, Belgium
15/02/2008
"Neutrino Astronomy with IceCube" – European School of High Energy Physics, Herbeumont,
Belgium 15/06/2008
"Neutrino astronomie met IceCube" – FWO Dag van de Onderzoeker, Brussels, Belgium
23/10/2008

Julie Delvax

Etude des interactions diffractives avec production de jets dans l'expérience H1" – Saint Flour, France 04/12/2008

Jorgen D'Hondt

"Getting ready for data taking with CMS and e" – Standard Model and Beyond in het LHC Era Congress, Santiago, Chili, 5-21/1/2008

"Tracker contribution from IIHE" – CMS Top Quark Meeting & Tracker Institution Board Meeting, Geneva, Switzerland, 8-9/7/2008

"Statistics for particle physics. The electroweak" – Workshop on detectors and Calculation Methods in Particle Physics, Teheran, Iran, 1-9/2/2008

"Actions for lepton+jet works" – Top Quark Meeting, Geneva, Switzerland, 1-2/9/2008

"Overview of the goals of the Top Quark Workshop" – Top Quark Workshop & CMS Week, Geneva, Switzerland, 16-25/9/2008

"Introduction to the Analysis" – Analysis Support Workshop, Geneva, Switzerland, 15-16/12/2008

Laurent Favart

"Diffractive Physics at HERA" – Liege 16/01/2008

"DVCS and its t-dependence at HERA-II" – DIS08 – London 09/04/2008

Xavier Janssen

"Diffractive electroproduction of rho and phi mesons at H1" – XVI International Workshop on Deep-Inelastic Scattering and Related Subjects, London, UK 08/05/2008

"LC-TPC read-out" – ILC-ECFA Workshop, Warsaw, Poland 10/06/2008

"LC-TPC read-out" – EUDET Annual Meeting, NIKHEF, Amsterdam 07/10/2008

Mathieu Labare

"False Discovery Rate controlling procedure applied to Point Source search", Liège 16/05/2008

Pierre Marage

"Vector meson production and DVCS at HERA" – HERA-LHC Workshop, CERN, Geneva, Switzerland, 05/2008

"Meson production at HERA" – MESON 2008 Conference, Krakow, Poland, 06/2008

Matthias Mozer

"LHC Searches for High-Mass Resonances Decaying to Leptons or Photons" – London, UK, 08/04/08

"Triggers for New Physics at the LHC" – Valencia, Spain, 13/12/08

Alfio Rizzo

" Search for Neutralino Dark Matter with the AMANDA Neutrino Telescope and Prospects for IceCube" – 4th International Workshop on the Dark Side of the Universe, Cairo, Egypt, 01/06/2008

Robert Roosen

"Inclusive diffraction and DPDF's" – La londe les Maures, France, 11/09/2008

Pascal Vanlaer

"CMS electrons / photons working group: status and plans" – Minsk, Belarus, 17/09/2008

"Study of backgrounds to Z'->ee" – Virtual meeting with Fermilab 20/03/2008

Pierre Van Mechelen

- "Forward physics at the LHC" – Illa da Toxa, Galicia, Spain, 8–14/6/2008
- "Experimental results on diffraction" – Galena, Illinois, USA, 26–31/5/2008
- "Forward and low x programme with CMS at the LHC" – London, UK, 7–11/4/2008
- "Experimental Summary" – Hamburg, Germany, 15–20/9/2008

Petra Van Mulders

- "Top as a tool at the LHC" – La Biodola, Isola d Elba, Italy, 22/05/2008

Nick Van Remortel

- "Measurements of the Top quark mass at CDF" – Elba, Italy, 20/05/08

XI.4 POSTER PRESENTATIONS AT CONFERENCES, WORKSHOPS AND SCHOOLS

Gilles De Lentdecker

- "Data Acquisition System for a Large TPC" – Dresden, Germany, 22/10/2008

XI.5 PRESENTATIONS AT COLLABORATION MEETINGS

Sabrina Bechet

- "Detection of ν_τ via τ to μ decays" – Madison, USA, 01/04/2008
- "Detection of ν_τ via τ to μ decays" – Utrecht, The Netherlands, 16/09/2008

Marco Cardaci

- "ADD to monojets" – Geneva, Switzerland, 08/02/2008
- "Status report on the cluster overlapping " – Geneva, Switzerland, 03/04/2008
- "Status report on the cluster overlapping " – Geneva, Switzerland, 16/04/2008
- "Cluster merging" – Geneva, Switzerland, 13/05/2008
- "Cluster splitting" – Geneva, Switzerland, 28/05/2008
- "Cluster splitting" – Geneva, Switzerland, 10/10/2008
- "Cluster splitting" – Geneva, Switzerland, 14/11/2008
- "Cluster splitting" – Geneva, Switzerland, 28/11/2008

Vincent Dero

- "Study on kinematical cuts for reducing ttbar background", CERN, Geneva, Switzerland, 10/10/2008
- "ttbar bg: e–mu method" , CERN, Geneva, Switzerland, 16/06/2008
- "Estimating ttbar background from e–mu events", CERN, Geneva, Switzerland, 26/06/2008
- "Background studies: ttbar bg (e/mu method)" , CERN, Geneva, Switzerland, 25/04/2008
- "Ttbar background study" , CERN, Geneva, Switzerland, 14/03/2008

Jorgen D'Hondt

- "CMS Week, Limassol, Cyprus, 22–29/6/2008
- "Progress of the Top Quark Studies in CMS" – CMS Physics Week, Geneva, Switzerland, 3–7/11/2008
- "Top Quark Physics in CMS" –CMS Week, Geneva, Switzerland, 8–12/12/2008

Sherif Elgammal

- "High energy electrons in the CMS ECAL" 06/08/2008
- "Recovery of high pt electrons from large pairs, lost in CMS ECAL cracks and in case of a missing ECAL endcap " – Exotica meeting at CERN, Geneva 11/07/2008
- "Recovery of high pt electrons from large pairs, lost in CMS ECAL cracks and in case of a missing ECAL endcap" – Egamma DPG meeting, CERN, Geneva 02/06/2008

Gregory Hammad

- "Multi-jet background estimation from data for semi-muonic top quark studies" , Geneva, Switzerland, 08/01/2008
- "Multi-jet background estimation from data for semi-muonic top quark studies (update)", Geneva, Switzerland, 25/01/2008
- "Multi-jet background estimation from data for semi-muonic top quark studies (update)" , Geneva, Switzerland, 10/04/2008
- "Multi-jet background estimation from data for semi-muonic top quark studies (update)", Geneva, Switzerland, 10/06/2008
- "Jet selection for semi-muonic top quark studies", Geneva, Switzerland, 14/10/2008

Daan Hubert

- "Solar neutralinos 2001-2003" - Utrecht University, Utrecht, Netherlands 15/09/2008
- "Solar neutralinos 2001-2003" - University of Wisconsin-Madison, Madison, USA 30/04/2008

Mathieu Labare

- "False Discovery Rate controlling procedure applied to Point Source search" - Madison, USA, 30/04/2008
- "False Discovery Rate controlling procedure applied to Point Source search - Sensitivity Comparison" - Utrecht, The Netherlands, 16/09/2008
- "The FDR Procedure in 10 minutes" - Brussels, Belgium, 23/10/2008
- "FDR Data Challenge, what's new since Utrecht" - Brussels, Belgium, 23/10/2008
- "Final Results on FDR method applied on Data Challenge" - Brussels, Belgium, 08/12/2008

Joris Maes

- (b-tag/top: estimating flavour tagging efficiencies with top events, CERN, Geneva, Switzerland):"Measurement of b tag efficiency with t-tbar semi-leptonic decays (KinFit/LLR method) UPDATE" 03/10/2008
- (b-tag/top: estimating flavour tagging efficiencies with top events, CERN, Geneva, Switzerland):"Measurement of b tag efficiency with t-tbar semi-leptonic decays (KinFit/LLR method) UPDATE" 07/04/2008
- (b-tag/top: estimating flavour tagging efficiencies with top events, CERN, Geneva, Switzerland):"Measurement of b tag efficiency with t-tbar semi-leptonic decays (KinFit/LLR method) UPDATE" 21/04/2008
- (b-tag/top: estimating flavour tagging efficiencies with top events, CERN, Geneva, Switzerland):"Measurement of b tag efficiency with t-tbar semi-leptonic decays (KinFit/LLR method) UPDATE" 05/05/2008
- (b-tag/top: estimating flavour tagging efficiencies with top events, CERN, Geneva, Switzerland):"Measurement of b tag efficiency with t-tbar semi-leptonic decays (KinFit/LLR method) UPDATE" 02/06/2008
- (Top quark meeting, CERN, Geneva, Switzerland):"Analysis structure b-tag performance from top events" 10/06/2008
- (b-tag/top: estimating flavour tagging efficiencies with top events, CERN, Geneva, Switzerland):"Measurement of b tag efficiency with t-tbar semi-leptonic decays (KinFit/LLR method) UPDATE" 30/06/2008
- (b-tag/top: estimating flavour tagging efficiencies with top events, CERN, Geneva, Switzerland):"Measurement of b tag efficiency with t-tbar semi-leptonic decays (KinFit/LLR method) UPDATE" 14/07/2008
- (b-tag/top: estimating flavour tagging efficiencies with top events, CERN, Geneva, Switzerland):"Measurement of b tag efficiency with t-tbar semi-leptonic decays (KinFit/LLR method) UPDATE" 11/08/2008
- (b-tag/top: estimating flavour tagging efficiencies with top events, CERN, Geneva, Switzerland):"Measurement of b tag efficiency with t-tbar semi-leptonic decays (KinFit/LLR method) UPDATE" 08/09/2008
- (Analysis Support Task Force, CERN, Geneva, Switzerland):"Collecting the information of the CRAB surveys (+ discussion)" 16/12/2008

Matthias Mozer

"The HEEP Analysis, Integration and Improvements" – Geneva, Switzerland, 19/09/08
"Search for high mass resonance production decaying into an electron pair in the CMS experiment" – Geneva, Switzerland, 15/07/08
"e/gamma isolation" – Geneva, Switzerland, 14/10/08
"Trigger DQM Status report" – Geneva, Switzerland, 14/01/08
"egamma online DQM: current needs" – Geneva, Switzerland, 06/02/08
"egamma trigger validation: status" – Geneva, Switzerland, 06/02/08
"EM_80: Farewell to Constant Cutoffs" – Geneva, Switzerland, 09/07/08

Robert Roosen

"VFPS calibration and HERA beam optics" 17/07/2009

Petra Van Mulders

"Jet Energy Scale Corrections from Top Events" – Top Quark Analysis review meeting, CERN, Geneva, Switzerland, 10/04/2008
"Jet Energy Scale corrections from top (pre-approval)" – Top Quark Meeting (pre-approvals), CERN, Geneva, Switzerland, 23/04/2008
"Jet Energy Scale from Top" – Physics Analysis Approval Meeting, CERN, Geneva, Switzerland, 07/05/2008
"Analysis structure jet energy scale from top events" – Top Quark Meeting, CERN, Geneva, Switzerland, 10/06/2008
"Isolation Study" – Top Quark Meeting, CERN, Geneva, Switzerland, 30/09/2008
"Muon Isolation in top events" – V+jets cross PAG meeting, CERN, Geneva, Switzerland, 28/11/2008

Nick Van Remortel

"Tracking contributions from the Antwerp group" – CERN, Geneva, Switzerland, 23/09/08

Ilaria Vilella

"Performance of the Jet Rejector tool" – Jet Algorithms CMS group meeting, CERN Geneva, Switzerland, 12/02/2008
"Jet Rejector Tool" – Top quark group meeting, CERN Geneva, Switzerland, 18/03/2008
"Event Generation in Brussels" – W+jets studies meeting, CERN Geneva, Switzerland, 12/09/2008

XII. SCIENTIFIC VULGARISATION AND OUTREACH ACTIVITIES

Sabrina Bechet

"Exercices" – Master Class, 26/01/2008
"Exercices" – Master Class, 23/02/2008

Daniel Bertrand

"Cosmic Rays Detection" – Practicals for College Pupils – Whole scholar year

Catherine De Clercq

"GAPP (Gender Awareness Participation Process) project" – school visit 5/06/2008
"Member of the Flemish Physics Olympiads Committee" – Physics Olympiads since 2005
"Bezoek TU Delft" – laboratory visit 14/04/2008
"Van de Big Bang tot nu ... en terug" – workshop during Vlaamse Wetenschapsweek 24/10/2008
"Kosmische straling" – workshop during the Vlaamse Wetenschapsweek 21/10/2008

Gilles De Lentdecker

"Organizer" – Master Class, 26/01/2008

Olbre Depaepe

"Herfstkamp Kosmische straling: boodschappers uit de ruimte" – Master Class, 31/10/2008

"Meesteklassen: wetenschapsweek Kosmische straling: boodschappers uit de ruimte" – Master Class, 24/10/2008

Vincent Dero

"PC – Exercises" – Master class, 23/02/2008

Olivier Devroede

"Kosmische straling: boodschappers uit de ruimte" – Stand op wetenschapsfeest, 17/10/2008

"Kosmische straling: boodschappers uit de ruimte" – Meesteklassen: wetenschapsweek, 24/10/2008

"Kosmische straling: boodschappers uit de ruimte" – Herfstkamp, 31/10/2008

Eddy De Wolf

"Van Quarks tot Oerknal" – Wetenschapsweek 2008, 24/10/1008

Jorgen D'Hondt

"Organised visit Cern" – Laboratory visit 28–30/3/2008,

"International Physics Olympiad – Hanoi University, Vietnam" – National representative 19–30/7/2008

"Start-up of the LHC project at CERN" – Press conference 08/09/2008

"The LHC project" – Several television and radio interviews 2008

Gregory Hammad

"Quiz in particle physics" – Master Class 23/02/2008

"Presentation of the CMS experiment and associated lab activities" – Master Class 23/02/2008

Tomas Hreus

"exercices on PC and a guide for laboratory visits" – Master class, 31/01/2009

Mathieu Labare

"IceCube Laboratory Visit" – Masterclasses, 23/02/2008

Joris Maes

"Quiz en leiden discussiegroep" – Wetenschapsweek VUB, 24/10/2008

"Representative voor de opleiding master in de fysica aan de VUB" – Sid-In Haasrode, 18/01/2008

"Assisted Jorgen in a guided tour at CMS (point 5)" – Guided tour at CMS (point 5), 29/03/2008

Pierre Marage

"Femmes et Sciences – la recherche Newtonia" – Groupe de pilotage Egalité des chances, groupe Suez, Brussels, Belgium, 30/01/08

"La vulgarisation scientifique et le Printemps des Sciences" – Emission Tout autre chose, La Première, RTBF, Brussels, Belgium, 07/02/08

"Interview radio RTBF-1" – Les femmes et les sciences, 20/04/08

"The Solvay Councils and the birth of modern physics" – Réunion européenne de coordination ASPERA, 15/02/08

"Relativité, mécanique quantique et ruptures épistémologiques" – Leçon inaugurale cycle Initiation à la cosmologie, Société royale d'Astronomie, Brussels, Belgium, 13/09/08

"The Solvay Councils and the birth of modern physics" – Réunion générale ASPERA 29/09/08

"Les combats de Galilée" – CEPULB 25/11/08

Catherine Vander Velde

"Master classe de physique des particules" – Master classe 26/01/2008

"Master classe de physique des particules" – Master classe 23/02/2008

"The Large Hadron Collider : the LHC" – Press conference 09/09/2008
"LE LHC, le nouvel accélérateur du CERN – Quelles réponses nous apportera-t-il?" – Conference for CEPULB 09/12/2008
"Erreurs de mesure et ressort" – Encadrement de laboratoire pour les lauréats des olympiades de physique 25/03/2008

Pascal Vanlaer

Interview for Le Soir 10/09/2008
"Une semaine pas banale" – Interview on RTBF1 13/09/2008

Walter Van Doninck

"Guide" – CMS visits many

Pierre Van Mechelen

"Meesterklas Deeltjesfysica" – Masterclass, 8/3/2008
"Visit of astronomy youth club Oberon to CERN" – Laboratory Visit, 5–6/4/2008
"Vlaamse Wetenschapsweek" – Laboratory visit, 17–26/10/2008
"EOS Start To Know video blog" – Weblog, 20/11/2008 –20/01/2009
"CP-schending" – Seminar at Volkssterrenwacht Urania, 14/10/2008

Petra Van Mulders

"Info verstrekken aan toekomstige studenten Natuurkunde" – Infodag VUB 6/9/2008
"quiz" – Wetenschapsweek, 24/10/2008

Nick Van Remortel

"Meesterklassen deeltjesfysica" – Master Class, 08/03/08
"Urania Seminar: De large Hadron Collider" – Seminar 30/09/08
"Wetenschapscafe Antwerpen" – Debate 21/10/08
"Acie Universiteit Antwerpen ActUA seminar: Speurtocht naar nieuwe fysica" – Seminar, 11/12/08
"Jong-KVVCV seminar" – Seminar 29/10/08
"De Morgen" – Newspaper interview, 09/10/08,
"De Morgen, opiniestuk" – Newspaper article, 12/09/08
"De Morgen" – Newspaper interview, 11/09/08
"VRT nieuws" – TV interview, 10/09/08
"EOS Scilogs" – Science Blog, 09/02/08

Gaston Wilquet

Lecture on "Le modèle du Big-Bang" – Master Class, 26/01/2008

XIII. ATTENDANCE TO CONFERENCES, WORKSHOPS AND SCHOOLS

XIII.1 CONFERENCES AND WORKSHOPS

Daniel Bertrand

"Neutrino Oscillations in Venice", Venice-Italy, 15–18/04/2008
"International Conference on Particles And Nuclei (PANIC08)", Eilat-Israel, 09–14/11/2008

Peter Bruyndonckx

"New Developments in Photodetection – NDIP08", Aix-les-Bains, France, 15–20/06/2008
"Workshop BrainPET project", Madrid, Spain, 03–05/09/2008

Marco Cardaci

"Les Rencontres de Moriond, QCD and High Energy Interactions", Oral presentation, La Thuile, Italy, 08–15/03/2008

"IAP Meeting", Liège, Belgium, 16/01/2008
"FYSICA 2008", Poster, Nijmegen, The Netherlands, 18/04/2008

Jun Dang

"IEEE 2008 Medical Imaging Conference", Dresden, Germany, 19/10/2008 – 25/10/2008

Catherine De Clercq

"IceCube Deep Core workshop", Stockholm, Sweden, 17–19/03/2008
"Identification of Dark Matter 2008", Oral presentation, Stockholm, Sweden, 18–22/08/2008
"European Priorities in Astroparticle Physics workshop", Conference organizer, Brussels, Belgium, 29–30/09/2008
"ASPERA Belgian National Day", Oral presentation, Conference organizer, Session chairperson, Brussels, Belgium, 15/02/2008
NIKHEF Scientific Advisory Committee meeting", Amsterdam, Netherlands from 17/04/2008
"General Scientific Meeting of the Belgian Physical Society", Session organizer, ULB, Brussels, Belgium, Session title: Fundamental Interactions, Conference organizer, 21/05/2008
"Kennismakers, Dag van de Onderzoeker", Oral presentation, Brussels, Belgium, 23/10/2008
"Mind the GAPP", European Parliament, Brussels, Belgium, 4/11/2008
"2008 European School of High Energy Physics", Oral presentation, Conference organizer, Herbeumont, Belgium, 8–21/06/2008

Gilles De Lentdecker

"IEEE Nuclear Science Symposium 2008", Poster, Dresden, Germany, 19–25/10/2008

Julie Delvax

–"DIS 2008", London, UK, 07/04/2008 – 11/04/2008

Olbreun Depaeppe

"DeepCore conference workshop", Stockholm, Sweden, 17–19/03/2008

Vincent Dero

"IAP meeting", Liege, Belgium, 16/01/2008
"Belgian Physical Society meeting", ULB, Brussels, Belgium, 21/05/2008
"IAP meeting", Leuven, Belgium, 28/05/2008
"Physics Days", CERN, Geneva, Switzerland, 22–25/06/2008

Olivier Devroede

"Quattor Developers workshop", Amsterdam, The Netherlands, 17–29/10/2008

Eddy De Wolf

"International Symposium on Multiparticle Dynamics", DESY, Hamburg Session organizer
Session title: Strategies and methods Session chair-person from 15–20/09/2008
"XVI International Workshop on Deep–Inelastic Scattering and Related Subjects", University College London from 07–11/04/2008

Jorgen D'Hondt

Top Quark Conference, Pisa, Italy, 18–27/5/2008
"Jet Workshop", Paris, France, 19–20/6/2008

Laurent Favart

"IAP Meeting – Fondemental Interactions Fondamentales", Oral presentation, Liège, Belgium, 16/01/2008
"16th International workshop on Deep–Inelastic Scattering – DIS08", Oral presentation, London, UK, 07–11/04/2008
"Diffraction 2008", Oral presentation, La Londe–les–Maures, France, 09–12/09/2008
"Journées Jeunes Chercheurs 2008", Conference organizer St Flour, France, 01–06/12/2008

Gregory Hammad

"IAP meeting", Liège, Belgium, 16/01/2008
"Journées des doctorants", Louvain-La-Neuve, Belgium, 16/05/2008
"International workshop on top quark physics", Elba Island, Italy, 18–24/05/2008
"IAP meeting", Leuven, Belgium, 28/05/2008

Xavier Janssen

"XVI International Workshop on Deep–Inelastic Scattering and Related Subjects", Oral presentation, London, UK, 07–11/05/2008
"ILC–ECFA Workshop", Oral presentation, Warsaw, Poland, 09–12/06/2008
"EUDET Annual Meeting", Oral presentation, Amsterdam, The Netherlands, 06–08/10/2008

Mathieu Labare

"Journée des Doctorants", Oral presentation Liège, Belgium, 16/05/2008

Joris Maes

"Journée Jets", PAF, Paris, France 19–20/06/2008
"Top 2009 Workshop", Poster, Elba, Italy, 20–24/05/2008
"Lepton+Jets workshop", CERN, Geneva, Switzerland 16–19/09/2008

Pierre Marage

"MESON 2008 Conference", Oral presentation, Krakow, Poland, 06/2008
"HERA–LHC Workshop", CERN, Oral presentation, Geneva, Switzerland, 05/2008

Matthias Mozer

"DIS2008", Oral presentation, London, UK, 07–11/04/09
"DISCRETE08", Oral presentation, Valencia, Spain, 11–16/12/2008

Robert Roosen

"Dag Colloquium", Ghent, Belgium, 06/02/2008
"International Workshop on Diffraction in High–Energy Physics", Oral presentation, La Londe–les–Maures, France, 09–14/09/2008

Stefaan Tavernier

"CERIMED workshop", Marseille, France, 23–24/4/2008
"IEEE SSS/MIC Meeting", Dresden, Germany, 20–25/10/2008
"Workshop on PET–MR", Session organizer, Session chairperson, Jülich, Germany, 26–28/10/2008
"CERIMED workshop", Marseille, France, 9–12/12/2008

Catherine Vander Velde

"International workshop on top quark physics – 2008", Elba, Italy, 18–24/05/2008

Pascal Vanlaer

"RDMS–CMS meeting", Oral presentation, Minsk, Belarus, 15–19/09/2008
"LHC Physics Center meeting", Oral presentation, Fermilab, USA, 20/03/2008

Pierre Van Mechelen

"XVI International Workshop on Deep–Inelastic Scattering and Related Subjects", Oral presentation, London, UK, 07–11/04/2008
"19th Hadron Collider Physics Symposium 2008", Oral presentation, Galena, Illinois, USA, 27–31/05/2008
"Hard Probes 2008", Illa da Toxa, Oral presentation, Galicia, Spain, 08–14/06/2008
"International Symposium on Multiparticle Dynamics", Oral presentation, Hamburg, Germany, 15–20/09/2008

Petra Van Mulders

"Lepton+ jets workshop CMS", Geneva, Switzerland, 18–19/09/2008
"Top2008 International Workshop on Top Quark Physics", Oral presentation, Poster, Isola d'Elba, Italy, 18–24/05/2008
"Kick-off workshop of the ASTF group", Geneva, Switzerland, 16/12/2008
"Journée Jets", Paris, France, 20/06/2008

Nick Van Remortel

"Top 2008", Oral presentation, Elba, Italy, 18–24/05/08
"IUAP meeting on 'Fundamental Interactions'", Oral presentation, Leuven, Belgium, 28/05/08
"IUAP Working group on Future experiments", , Ghent, Belgium, 22/02/08
"IUAP Working group on Future experiments", Session chair-person, Louvain-la-Neuve, 17/03/08
"IUAP Working group on Future experiments", Session chair-person, Antwerp, Belgium, 13/05/08
"IUAP Working group on Future experiments", Session chair-person, Brussels, Belgium, 16/12/08

Ilaria Vilella

"Top2008 workshop", Elba, Italy, 19–23/05/2008
"jet+leptons workshop", Geneva, Switzerland, 18–19/09/2008
"ASTF workshop", Geneva, Switzerland, 18/12/2008

Mateusz Wedrowski

"IEEE – Medical Imaging Conference", Dresden, Germany, 19–25/10/2008

Pierre Vilain

"IVth International Workshop on Neutrino Oscillations", Session chair-person, Venice, Italy 15–18/04/2008

Gaston Wilquet

"IVth International Workshop on Neutrino Oscillations", Session chair-person, Venice, Italy 15–18/04/2008

Li Zhi

"48th Crystal Clear Collaboration Meeting", Oral presentation, Heidelberg, Germany, 25–27/03/2008
"49th Crystal Clear Collaboration Meeting", Geneva, Switzerland, 12–14/11/2008

XIII.2 SCHOOLS

Sabrina Bechet

"BND graduate school" Texel, ,The Netherlands, 15–26/09/2008
"Icecube software bootcamp" Berlin, Germany, 28/07–01/08/2008

Marco Cardaci

"The 2008 Hadron Collider Physics Summer School" Batavia, Illinois, USA, 12–22/08/2008

Julie Delvax

"Journées Jeunes Chercheurs" Saint Flour, France, 30/11–06/12/2008

Olbrein Depaepe

"Joint Belgian Dutch German Graduate School" Texel, The Netherlands, 15–26/09/2008

Olbrein Depaepe

"IceCube software bootcamp" Berlin, Germany, 27/07–02/08/2008

Vincent Dero

"Belgian Dutch German graduate school in particle physics (BND School)", Texel, The Netherlands, 15–26/09/2008

Sherif Elgammal

"2008 European School of HEP", Herbeumont, Belgium, 08–21/06/2008

Gregory Hammad

"BND school", Texel, The Netherlands, 15–26/09/2008

"Phenomenology in quantum chromodynamics", Brussels, Belgium, 21–06/05/2008

Mathieu Labare

"School of Statistics" Strasbourg, France, 30/06/2008 – 04/07/2008

Alfio Rizzo

"International School on Astroparticle Physics" Arnhem–Velp The Netherlands, 30/08/2006 – 08/09/2006

Ilaria Vilella

"2008 European School of HEP – CERN school" Herbeumont, Belgium, 08–21/06/2008

Mateusz Wedrowski

"Programming with Mathematica – cours" , Leuven, Belgium, 08/09/2008

XIV. RESPONSIBILITIES IN EXPERIMENTS

Daniel Bertrand

Member IceCube Collaboration Board

Member IceCube Executive committee

Peter Bruyndonckx

Member Crystal Clear Collab Steering committee

Member representant from the Crystal Clear Collaboration NEMA Animal PET Standard

Member co-representant from the IIHE Crystal Clear Collaboration Steering Committee

Member co-representant from the Crystal Clear Collaboration Steering Committee of the international Open Gate collaboration

Marco Cardaci

Member CMS Exotica

Catherine De Clercq

Principal Investigator for VUB IceCube Collaboration Board

Member IceCube Spokesperson Search Committee

Gilles De Lentdecker

Responsible of the Tracker Geometry Validation CMS Tracker Group

Olbren Depaepe

Member IceCube WIMP group

Jorgen D'Hondt

convenor CMS Top Quark group

convenor CMS Analysis Operation Task Force

deputy CMS collaboration board

member CMS statistics committee
deputy CMS tracker collaboration

Sherif Elgammal

Member CMS, Debugging Data Transfers
Member CMS, Deprecation and installation of CMSSW releases
Member CMS, Shifts for the cosmic data taken by CMS at CERN
Member CMS, Shifts for the off-line analysis of the tracker DQM

Laurent Favart

Working Group Convener H1 Diffractive Physics Working Group
Member H1 executive committee

Pierre Marage

Member H1 Executive Committee

Benoit Roland

Member CMS Forward Physics Analysis Group

Robert Roosen

Member H1 Collaboration board

Stefaan Tavernier

Member CERIMED executive committee
Spokesperson, chairman Crystal Clear Collab Collaboration board
Member CMS tracker institution board
Member CMS institution board
Member CMS finance board

Catherine Vander Velde

Member CMS Collaboration Board
Member CMS Finance Board
Member CMS Tracker Institution Board
Member CMS Tracker Finance Board
Representing Belgium ACCU Comité des utilisateurs du CERN

Pascal Vanlaer

Co-convenor CMS Electron-Photon physics group
Tier-2 representative CMS Computing
Tier-2 representative W-LCG W-LCG

Walter Van Doninck

Coordinator CMS Forward RPC system and YE1 inner end caps

Nick Van Remortel

Member CMS Tracker Institution Board
Convenor CDF Top Mass working group

Gaston Wilquet

Chairperson OPERA Collaboration Board
Chairperson OPERA Editorial Board
Member OPERA Analysis Advisory Board

XV. MEMBERSHIP IN ACADEMIC JURY'S

Daniel Bertrand

Doctorat UMH "Transient Waveform Recorder Measurements from the AMANDA-II detector", Member
Mémoire Licence ULB "Signatures of Scalar Dark Matter", Member

Catherine De Clercq

PhD thesis Université de la Méditerranée, Aix-Marseille II "Etalonnage temporel du télescope à neutrino Antares et recherche indirecte de matière noire du type", Member
Ph.D. Vrije Universiteit Brussel "Johns equation and penalized likelihood sinogram restoration in computed tomography", Member

Jorgen D'Hondt

-PhD Defense KTH, Stockholm, Sweden "" Member
-PhD Defense IN2P3 – Lyon, France "" Member
PhD Defense ULP – Strasbourg, France ""Member
PhD Defense Vrije Universiteit Brussel "Potential for Top Quark physics with the CMS detector at the LHC" Promotor

Laurent Favart

PhD Université Libre de Bruxelles "Mesure de la diffusion Compton à haute virtualité à HERA II", Promotor
PhD Université Libre de Bruxelles and Pavol Jozef Safarik University "Studies of Diffractive Scattering of Photons at Large Momentum Transfer And of the VFPS Detector at", Promotor
PhD Ecole Polytechnique (Paris) "Mesure de la constante de couplage forte α_S avec les jets hadroniques en diffusion inélastique", Member

Xavier Janssen

These ULB "Mesure de la diffusion Compton à haute virtualité à HERA II", Member

Pierre Marage

"Docteur en sciences ULB ", President
"Agrég. ens. sup ULB ", Member
"Agrég. ens. sup ULB " Member

Robert Roosen

PHD UCL "Measurement of the photon induced processes in CMS and forward proton detection at the LHC" , Member

Stefaan Tavernier

PhD thesis Vrije Universiteit Brussel "Image reconstructing in small animal SPECT", Member
PhD thesis Vrije Universiteit Brussel "Johns equation and penalized Likelihood Restoration in Computed Tomography", Member
PhD thesis VUB Technische Universiteit Delft "Monolithic scintillator detectors for high resolution positron emission tomography", Member

XVI. LIST OF PUBLICATIONS, REPORTS AND CONTRIBUTIONS TO CONFERENCES

XVI.1 PUBLICATIONS

A. NEUTRINO PHYSICS : CHORUS

Leading order analysis of neutrino induced dimuon events in the CHORUS experiment
Kayis-Topaksu, A; Onengut, G; van Dantzig, R, et al.
Nucl.Phys.B 798 (2008) 1-16

Final results on $\nu(\mu) \rightarrow \nu(\tau)$ oscillation from the CHORUS experiment
Eskut, E; Kayis-Topaksu, A; Onengut, G, et al.
Nucl.Phys.B 793 (2008) 326-343

B. NEUTRINO PHYSICS : OPERA

Emulsion sheet doublets as interface trackers for the OPERA experiment
Anokhina, A.; Aoki, S.; Ariga, A., et al.
JINST 3 (2008) P07005

Study of the effects induced by lead on the emulsion films of the OPERA experiment
Anokhina, A.; Aoki, S.; Ariga, A., et al.
JINST 3 (2008) P07002

C. NEUTRINO PHYSICS : ICECUBE

Multiyear search for a diffuse flux of muon neutrinos with AMANDA-II (vol 76, artn 042008, 2007)

Achterberg A, Ackermann M, Adams J, et al.
Phys.Review D 77 (2008)089901

Search for ultra-high-energy neutrinos with amanda-II
Ackermann M, Adams J, Ahrens J, et al.
Astropart.Phys.675 (2008) 1014-1024

D. EP PHYSICS : H1

Study of Charm Fragmentation into D^{*+} Mesons in Deep-Inelastic Scattering at HERA.
F.D. Aaron *et al.*
Submitted by Eur.Phys.J.C

Multi-lepton production at high transverse momenta in ep collisions at HERA
Aaron FD, Alexa C, Andreev V, et al.
Phys.Lett.B 668 (2008) 268-276

Search for excited electrons in ep collisions at HERA
Aaron FD, Alexa C, Andreev V, et al.
Phys.Lett.B 666 (2008) 131-139

Measurement of the proton structure function $F_2(x, Q^2)$ at low x
Aaron FD, Alexa C, Andreev V, et al.
Phys.Lett.B 665 (2008) 139-146

A search for excited neutrinos in $e(-) p$ collisions at HERA
Aaron FD, Alexa C, Andreev V, et al.
Phys.Lett.B 663 (2008) 382-389

Measurement of deeply virtual compton scattering and its t -dependence at HERA
Aaron, F.D.; Aktas, A.; Alexa, C., et al.
Phys.Lett.B 659 (2008) 796–806

Measurement of isolated photon production in deep-inelastic scattering at HERA
Aaron FD, Aktas A, Alexa C, et al.
Eur.Phys.J.C 54 (2008) 371–387

Three- and four-jet production at low x at HERA
Aaron FD, Aktas A, Alexa C, et al.
Eur.Phys.J.C 54 (2008) 389–409

E. E+ E- PHYSICS : DELPHI

Di-jet production in gamma gamma collisions at LEP2
Abdallah J, Abreu P, Adam W, et al.
Eur.Phys.J.C 58 (2008) 531–541

Observation of the muon inner bremsstrahlung at LEP1
Abdallah J, Abreu P, Adam W, et al.
Eur.Phys.J.C 57 (2008) 499–514

Higgs boson searches in CP-conserving and CP-violating MSSM scenarios with the DELPHI detector (vol 54, pg 1, 2008)
Abdallah J, Abreu P, Adam W, et al.
Eur.Phys.J.C 56 (2008) 165–170

Study of b -quark mass effects in multijet topologies with the DELPHI detector at LEP
Abdallah J, Abreu P, Adam W, et al.
Eur.Phys.J.C 55 (2008) 525–538

Measurement of the mass and width of the W boson in $e^{(+)} e^{(-)}$ collisions at $\sqrt{s}=161$ – 209 GeV
Abdallah J, Abreu P, Adam W, et al.
Eur.Phys.J.C 55 (2008) 1–38

Study of W -boson polarisations and triple gauge boson couplings in the reaction $e^{(+)}e^{(-)} \rightarrow W+W^{-}$ at LEP 2
Abdallah J, Abreu P, Adam W, et al.
Eur.Phys.J.C 54 (2008) 345–364

Higgs boson searches in CP-conserving and CP-violating MSSM scenarios with the DELPHI detector
Abdallah J, Abreu P, Adam W, et al.
Eur.Phys.J.C 54 (2008) 1–35

Measurement of the tau lepton polarisation at LEP2
Abdallah J, Abreu P, Adam W, et al.
Phys.Lett.B 659 (2008) 65–73

F. P-P PHYSICS : CMS

The CMS experiment at the CERN LHC
R. Adolphi et al., JINST 3 (2008) S08004

The CMS tracker operation and performance at the Magnet Test and Cosmic Challenge
W. Adam et al. JINST 3 (2008) P07006

Collider aspect of flavour physics at high Q, Report of Working group 1 of the CERN workshop
Flavor in the era of the LHC
F. Del Aguila et al., Eur. Phys. J. (2008) C57:183–308

Search for massive resonance production decaying into in an electron pair in the CMS experiment ,
EXO 2008–001

Towards a measurement of Inclusive $W \rightarrow e\nu$, $Z \rightarrow ee$ Cross Section in pp Collisions at $\sqrt{s} = 14$
TeV
EWK 2008–005

G. APPLIED R&D AND SPINOFF

Signal to noise ratio of APD–based monolithic scintillator detectors for high resolution PET
Maas MC, Schaart DR, van der Laan DJ, et al.
IEEE Transactions on Nuclear Science 55 (2008) 842–852

Evaluation of machine learning algorithms for localization of photons in undivided scintillator
blocks for PET detectors
Bruyndonckx P, Lemaitre C, van der Laan DJ, et al.
IEEE Transactions on Nuclear Science 55 (2008) 918–924

Communally breeding Bechstein's bats have a stable social system that is independent from the
postglacial history and location of the populations
Kerth G, Petrov B, Conti A, et al.
Molecular Ecology 17 (2008) 2368–2381

XVI.2 CONFERENCE PROCEEDINGS

A. APPLIED R&D AND SPINOFF

Optimization of a monolithic detector block design for a prototype human brain PET scanner*
Mendes, Pedro Rato; Bruyndonckx, Peter; Castro, Mario Canadas; Li, Zhi; Perez, Jose Manuel;
Martin, Iciar Sarasola; Nuclear Science Symposium Conference Record, 2008. NSS '08. IEEE, 19–25
Oct. 2008

Monte Carlo evaluation of monolithic scintillator block detectors using silicon PMTs* Zhi, Li;
Bruyndonckx, Peter; Jun, Dang; Wedrowski, Mateusz; Perez, Jose Manuel; Mendes, Pedro Rato;
Ziemons, Karl; Tavernier, Stefaan; Nuclear Science Symposium Conference Record, 2008. NSS '08.
IEEE, 19–25 Oct. 2008

A dedicated ASIC front–end readout for the monolithic detector blocks of the BrainPET prototype**
*Sarasola Martin, I.; Rato Mendes, P.; Navarrete, J.; Bruyndonckx, P.; Perez, J.M.; Willmott, C.;
Nuclear Science Symposium Conference Record, 2008. NSS '08. IEEE, 19–25 Oct. 2008

Beyond clearpet: Next aims – Ziemons K, Bruyndonckx P, Perez JM, et al; .Conference Information:
5th IEEE International Symposium on Biomedical Imaging – From Nano to Macro, MAY 14–17,
2008 Paris, FRANCE IEEE VOLS 1–4 (2008)

XVII.CMS NOTES

CMS AN-2008/101

High level triggers for high energy electrons at low luminosity

D. Evans, et al.

CMS AN-2008/077

The High Energy Electron Pair Analysis: An Experience of Integration and Improvements

M. Mozer, et al.

CMS AN-2008/048

Search for high mass resonance production decaying into an electron pair in the CMS experiment

D. Evans, et al.

CMS AN-2008/045

Electron ID at High Energies

D. Newbold, et al.

CMS AN-2008/044

Study of backgrounds to high-mass di-electron (Dell-Yan) final states

D. Bandurin, et al.

CMS AN-2008/029

Recovery of high pt electrons from large mass pairs, lost in CMS ECAL cracks and in case of a missing endcap

Sh. Elgammal, et al.

CMS IN-2008/009

Description of CSA07 SUSYBSM Skims

M. U. Mozer, M. Tytgat

CMS AN-2008/004

Search for massive resonance production decaying into an electron or a photon pair

J. Brooke, et al.

CMS NOTE-2008/032

Silicon Strip Tracker Detector Performance with Cosmic Ray Data at the Tracker Integration Facility

W. Adam, et al.

CMS NOTE 2008/028

Petal integration for the CMS tracker Endcaps

T. Bergauer et al.