

Annual Report — Research Activity

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We report on the second year of the *Marie Curie Research and Training Network* FLAVIA*net*. The report starts with summaries of the research achievements of the 11 nodes in Sect. 1. In Sect. 2 we list the publications of our network. Sect. 3 describes the presentation of our scientific results at international conferences and describes our networking activity. We discuss the economic spin-off of our research activity in Sect. 4. Finally we conclude.

1 Research Achievements

In this section we describe the scientific activity of the nodes with emphasis on the relation to the working groups and to milestones defined in Annex I of the FLAVIA*net* contract.

Node No. 1: Spain-V (Universitat de València Estudi General [UVEG])

In collaboration with nodes 9 and 11 [19] a detailed comparison between the results of (quenched)

lattice QCD and the predictions of (quenched) ChPT at NLO has been performed. In particular, two different chiral regimes (p - and ϵ -regimes) have been considered. Volume and quark mass dependence of current correlators has been studied. In the ϵ regime, also the dependence on the topological charge has been investigated. Finally, the leading order LECs F and Σ have been extracted in the two regimes (milestone no. 2): the agreement among those independent determinations shows that quenched QCD is well reproduced by quenched chiral effective theory at leading order.

The determination of LECs of ChPT is a relevant task for its predictability in low-energy hadron physics. Together with a calculation of the vector and axial-vector two-point functions at NLO in the $1/N_C$ expansion, a subleading estimation of L_{10} and C_{87} has been presented [20] (milestone no. 2). In addition and in collaboration with Bern (node 9) we have worked out the strange quark mass contributions of the electromagnetic $SU(2)$ LECs at NLO [21]. Similar results for the strong $SU(2)$ LECs at NNLO are in preparation.

We have obtained interesting results in the reaction $\gamma\gamma \rightarrow \pi\pi$ [22,23], extending the applicability of dispersion relations. We also studied the implication of strong scalar meson-meson dynamics on the pseudoscalar self-energies arriving to two constraints involving the chiral counterterms L_4 , L_5 , L_6 and L_8 [24]. In ref. [25] we studied the $I = 0$ and $1/2$ S-wave meson-meson dynamics up to 2 GeV, including multi-particle states (milestone no. 1). We have identified the lightest scalar glueball corresponding to the $f_0(1710)$ and a strong contribution to the $f_0(1500)$. The first scalar octet at around 1.4 GeV was identified as mainly an octet (milestone no. 4).

In collaboration with the node 4 [26,27] we have studied the production of exotic resonances and its decay to top-antitop quark pairs at Tevatron and the LHC. In addition a new method for the computation of cross-sections of multipartonic processes at the LHC with NLO accuracy have been developed in [28,29]. Finally the phenomenological predictions of Grand Unified Models (GUT) and its connections with proton decay have been presented in [30] (milestones no. 17, 18). In collaboration with Marseille (node 8) we developed a new general multi-scaled technique based on multidimensional inverse Mellin transformation [31] to obtain asymptotic expansions. We illustrated this by an application on the $g-2$ of the muon at 4 and 5 loops level (milestone no. 6). In collaboration with Bern/Zürich (node 9) we are applying this technique to the calculation of chiral integrals involved in the calculation of Kaon form factors (milestone no. 7). Also in collaboration with Orsay (node 8) we are looking for new applications of the Mellin-Barnes representation of QCD.

The group of Groningen addresses three lines of research. The first one is devoted to Lattice field theory for baryon interactions (milestone no. 4) and is part of the effort of the European Twisted Mass Collaboration (ETMC), which involves members of nodes 1, 8 and 11. The second line is a thorough investigation of how additional flavours of matter modify the phase structure of non-abelian gauge theories, in particular the transition from a confined to a deconfined phase [32]. Finally the third line aims to isolate a mechanism for the generation of the flavour and neutrino mass hierarchies within scenarios with extra dimensions (milestone no. 18). A more mathematical investigation of how Majorana spinors in four dimensions can be generated through boundary conditions on the compactified extra dimension(s) is in publication [33].

Tau physics is an important tool both to analyse the hadronization of QCD currents (in the semileptonic decays of the tau lepton) and to explore new physics (like in lepton flavour vio-

lation tau decays). Along these lines we have studied the latest data by the Belle experiment in the $\tau \rightarrow \nu_\tau K_S \pi$ decays [34], in collaboration with node 2, and lepton flavour violation tau decays in a constrained MSSM-seesaw scenario [35].

The research activities of the Valencia group in the BaBar experiment have expanded on the measurement of the CKM angle gamma [36–38], Mixing and CP Violation in D decays [39,40], the measurement of $|V_{ub}|$ using semileptonic decays [41], and the study of hadronic form factors in semileptonic D meson decays [42].

Node No. 2: Spain-B (Universitat Autònoma de Barcelona [UAB])

We calculate the $\sigma \rightarrow \gamma\gamma$ width = (1.2 ± 0.4) keV using only available precise experimental data on the proton electromagnetic polarizabilities together with analyticity and unitarity [43]. In [44] we review the recent calculations and present status of the hadronic light-by-light contribution to the muon $g - 2$. We computed the spin-independent structure functions of the forward virtual-photon Compton tensor of the proton at one loop using heavy baryon chiral perturbation theory and dispersion relations. We then computed the leading chiral term of the polarizability correction to the Lamb shift of the hydrogen and muonic hydrogen [45]. We studied the constraints that the operator product expansion imposes on large N_c inspired QCD models for current-current correlators. We explicitly showed that, assumed a given mass spectrum: linear Regge behavior in n (the principal quantum number) plus corrections in $1/n$, one can obtain the logarithmic (and constant) behavior in n of the decay constants within a systematic expansion in $1/n$ [46]. We identify for the first time ever a violation of the OPE in a quantum field theory, in the 't Hooft model [47]. We have computed the ground-state energies of systems containing up to twelve pions in dynamical, mixed-action lattice QCD, and found that the chemical potential receives a substantial contribution from the $3\pi^+$ interaction at the lighter pion masses we have investigated [48]. We calculated the K^+K^+ scattering length in fully-dynamical lattice QCD with domain-wall valence quarks on the MILC asqtad-improved gauge configurations with rooted staggered sea quarks, and use three-flavor mixed-action chiral perturbation theory at NLO to extrapolate to the physical m_K^+/f_K^+ value, finding $m_K^+ a_K^+ K^+ = -0.352 \pm 0.016$ [49]. We calculated the $I = 2\pi\pi$ scattering length in fully-dynamical lattice QCD with domain-wall valence quarks on the asqtad-improved coarse MILC configurations, and use two- and three-flavor mixed-action chiral perturbation theory at NLO to perform the chiral and continuum extrapolations, finding $m_\pi a_{\pi\pi}(I = 2) = -0.04330 \pm 0.00042$ [50]. We obtained a model independent expression for $B_0(m_u + m_d)$ from the electromagnetic correction to the η to 3 neutral pions [51]. All three-point order-parameter Green functions are computed at the next-to-leading logarithmic level. This calculation is a necessary ingredient for the matching of those Green functions with the resonance chiral theory at the corresponding level [16]. Recent experimental data on the decay $\tau^- \rightarrow \nu_\tau K_S \pi^-$ from the Belle collaboration are fit with a description of the required form factors based on analyticity, unitarity and the resonance chiral theory. The fits allowed to extract the resonance parameters of the $K^*(892)$ meson as well as the low-energy slopes of the $K\pi$ vector form factor [34]. The determination of α_s from hadronic τ decays is revisited. Based on a renormalon model of higher-order perturbative corrections to the Adler function it is demonstrated that α_s extracted from τ decays turns out significantly lower than found in pre-

vious determinations [52]. Final state polarization in $B \rightarrow VV$ decays are studied comparing $b \rightarrow s$ decays with their U-spin counterparts [53]. Three different strategies to extract the weak mixing phase of the B_s system together with comments on the isospin, forward-backward and polarization fraction of the K^* in the decay $B \rightarrow K^*l^+l^-$ are discussed [54]. New observables sensitive to the longitudinal spin amplitude of the K^* in the decay $B \rightarrow K^*l^+l^-$ are constructed and calculated in the framework of QCDF. They are analyzed in the SM and supersymmetry including their experimental sensitivity at LHCb and Super-LHCb [55]. We performed a phenomenological analysis of radiative $V \rightarrow P\gamma$ and $P \rightarrow V\gamma$ decays in order to determine the gluonic content of the η' wave function [56]. We deduced the η - η' mixing angle is from an updated phenomenological analysis of J/ψ decays into a vector and a pseudoscalar meson [57]. We calculated the radiative decays $V \rightarrow S\gamma$ and $S \rightarrow V\gamma$ with $V = \rho, \omega, \phi$ and $S = a_0, \sigma, f_0$ within the framework of the Linear Sigma Model [56]. We propose a low energy effective field theory of QCD at the scale of pion mass for the $N_B = 2$ sector, N_B being the baryon number, which contains two dibaryon fields in addition to the nucleons and pions. We calculate the scattering amplitudes at next-to-leading order for the 1S_0 and 3S_1 channels in this framework and obtain an excellent description of the phase shifts for center of mass energies in the $0 - 50 MeV$ range [58]. We illustrate how to apply modern effective field theory techniques and dimensional regularization to factorize the various scales which appear in non-relativistic bound states at finite temperature. We discuss in detail the interplay of the hard, soft and ultrasoft scales of the non-relativistic system at zero temperature with the additional scales induced at finite temperature. We also comment on the implications of our results for heavy quarkonium bound states in the quark gluon plasma [59]. We study the photon induced $\Lambda_b(1520)$ production in the effective Lagrangian method near threshold [60]. With the help of a model, we study the potential impact of duality violations on the determination of OPE parameters and, in particular, on the determination of α_s . We devise a method to extract these parameters from the experimental data in the presence of duality violations [61]. Using rational approximants, we determine the value of one of the order- p^6 parameters of the chiral Lagrangian. The new method used allows a better control of the systematic error than in previous determinations [62].

Node No. 3: UK (University of Durham [UDUR])

The UK node has contributed to the mission of Working Groups 1 [63–69], 2 [63, 70–73], 3 [74–81], 4 [82–84] and 5 [64–69, 71, 72, 85–89] and milestones 1,2,4,5, 7-11, 15 and 18.

Ref. [63] summarizes the results of working group 2, B, D, and K decays, of the workshop "Flavour in the Era of the LHC", held at CERN from November 2005 through March 2007. It provides, on one hand, a coherent, up-to-date picture of the status of flavour physics before the start of the LHC; on the other hand, it aims to initiate steps on the path towards integrating information on new physics from high- p_T and flavour data. Ball et al. contributed to the sections on weak decays of hadrons and QCD, radiative penguin decays and B-meson mixing. In Ref. [70], to be published in Physics Letters B, Ball et al. investigate the light-cone distribution amplitudes of the Λ_b baryon, which is a necessary ingredient in analyses of Λ_b decays into light hadrons. The QCD evolution equation is derived and solved to leading order in the QCD coupling. A simple model of the distribution amplitude is presented.

The Oxford group has studied exotic hadrons, focussing on methods to determine the nature of various enigmatic hadrons that may be molecules, hybrids or misidentified non-resonant effects [74–76]. Ref. [74] in particular criticises existing work in the literature and clarifies the flavour dependence of molecule formation, in both exotic and non-exotic channels. Ref. [75] shows that if the tetraquark $Z(4430)$ is a real state, then photoproduction may be used to clarify its status. Ref. [76] compares the flavour dependence of hybrid signals and effects driven by π exchange as a way of searching for, or eliminating, hybrid meson candidates. Hadron production of various flavours in charmonium decays is discussed in [77] and the potential for finding exotic light-flavoured hybrids in these decays evaluated. In Ref. [78] Close and Donnachie present a state-of-the-art treatise on electromagnetic interactions of hadrons. This will be a classic reference for a generation of experimentalists and phenomenologists.

The Southampton Group have been performing lattice computations with chiral fermions to obtain fundamental quantities in flavour physics. Perhaps the highlight has been the precise determination of the V_{us} element of the CKM matrix by calculating the semileptonic form factor of $K_{\ell 3}$ decays [65]. This work is being continued through the implementation of *partially twisted boundary conditions* to enable the determination of the form factor without the need for an extrapolation in the momentum transfer. A related project, based on the use of these boundary conditions, has been the first calculation of the pion’s electromagnetic form factor at low values of the momentum transfer and the determination of the charge radius. Another important aspect of our lattice work are the implications for chiral perturbation theory [87]. In addition to the evaluation of the low energy constants for pionic quantities we have studied the range of validity of one-loop chiral perturbation theory and find that it fails above about 400 MeV, and in particular for the strange quark. For this reason we have developed SU(2) chiral perturbation theory for the kaon sector, and this was one of the major Southampton contributions to ref. [87]. We advocate this as the method of choice for chiral extrapolations in kaon physics. Other significant Southampton contributions have included the evaluation of the decay constants of vector mesons [87, 89] and the low moments of parton distribution amplitudes [89]. In non-lattice flavour physics our work has focussed on the determination of the V_{ub} matrix element using analytical techniques.

Two photon production of hadronic resonances is one of the clearest ways of revealing their composition. A major input into the study of the enigmatic scalars is provided by data on $\gamma\gamma \rightarrow \pi^+\pi^-$ from Belle with a hundred times the statistics of all previous experiments. Pennington with the Belle group [80] have published a complete Amplitude Analysis of the world data on integrated and differential cross-sections on $\gamma\gamma \rightarrow \pi\pi$ and provided a new determination of the radiative widths of low mass isoscalar resonances [79, 81].

Node No. 4: Germany–South (Universität Karlsruhe (TH) [UniKarl])

The focus of the node has remained on the milestones no. 3,5,10 and 13-18, with the two major fields of precision physics within the Standard Model (SM) and the search for signals of physics beyond the SM. We computed electroweak corrections to the rare Kaon decay $K^+ \rightarrow \pi^+\nu\bar{\nu}$, which allows to probe short-distance physics with very small hadronic uncertainties, in [90]. In [52] we revisited the determination of α_s from hadronic τ decays, with a special emphasis

on the question of higher-order perturbative corrections and different possibilities of resumming the perturbative series with the renormalisation group: fixed-order (FOPT) vs. contour-improved perturbation theory (CIPT). Refs. [91–94] have addresses the static quark potential at the three-loop level, hadronic τ decays in the fourth order of α_s and the QCD sum rule for the Kaon distribution amplitude. Within non-relativistic QCD top-quark pair production and the toponium and bottomonium wave- functions at the origin have been calculated at NNNLO in [95, 96]. A new activity was the combination of perturbative methods in continuum QCD with lattice gauge theory to determine the charm quark mass from current-current correlators and the B meson mass splitting [97, 98]. We studied radiative B decays in [99, 100], focusing on the calculation of logarithmically enhanced electromagnetic corrections to the decay rate and forward backward asymmetry of the inclusive rare decay $B \rightarrow X_s \ell^+ \ell^-$. Using soft-collinear factorization and the heavy quark mass expansion the structure of heavy quark jets was analyzed in [101] at next-to-leading order for e^+e^- annihilation to determine the top quark mass scheme dependence in top mass reconstruction. A new approach to quantify infrared renormalons based on a novel infrared renormalization group evolution equation was given in [102]. The approach allows to relate short-distance heavy quark masses extracted from meson decays, quarkonia and heavy quark jets to the $\overline{\text{MS}}$ mass without large logarithmic terms. In [103] the two-loop soft corrections to the e^+e^- thrust and heavy jet mass event-shape distributions were computed. The complete NLO light-cone QCD sum rule analysis for $B \rightarrow \pi$ form factors has been re-investigated and updated in [104], and the work on semileptonic $b \rightarrow c$ has been continued [105, 106]. The structure of light cone distribution amplitudes has been investigated in a nonrelativistic model in [107].

Our research on physics beyond the SM has addressed studies in the Minimal Supersymmetric Standard Model (MSSM) (with and without grand unification), warped extra dimensions and the Littlest Higgs Model with T parity and has further included model-independent analyses. The MSSM Higgs sector was addressed in [108–110] analysing different observables in B physics. We studied the viability of Yukawa unification within general SUSY GUTs and found such unification to be challengend by the experimental data on FCNC processes [111, 112]. Detailed analyses of particle-antiparticle mixing, rare K and B decays and of lepton flavour violation within models with one warped extra dimension are in progress together with a more general analysis of the flavour structure of these models. We studied the impact of warped extradimensional scenarios on TeV scale physics, for the first time in the literature formulating the flavour structure of such a model. We performed a full analysis of flavour physics in that particular model, in particular of $\Delta F = 1$ and $\Delta F = 2$ processes in the quark sector. A CKM-fitter-based model-independent analysis of possible new physics effects in $b \rightarrow s$ transitions has been performed in [113]. Minimal Flavour Violation and a study of the corresponding flavour symmetries has been performed in [114] for quarks and in [115] for leptons. Model-independent aspects of particle-antiparticle mixing are discussed in [116, 117].

The experimental activity of the node in the BaBar experiment has addressed initial-state radiation events [118–120], the production of $\rho^+ \rho^-$ pairs [121] and the decay $\Upsilon(3S) \rightarrow \gamma \eta_b$ [122]. The group continues to analyse KLOE data [123–125].

Node No. 5: Italy (Istituto Nazionale di Fisica Nucleare [INFN])

The highlights of the research activity of the node include: **I.** Extraction of physical quantities from the unquenched simulations of $N_f = 2$ twisted-mass Wilson fermions within the ETM Collaboration [12, 139–142] (milestones n. 8,9,11). Several physical quantities, in the pseudo-scalar and vector-meson sector have been computed with unquenched up and down quark masses, corresponding to pion masses in a range from 250 to 550 MeV. Most importantly, the results have been obtained with statistical errors at the percent level while keeping lattice artifacts and finite volume effects well under control. Moreover, the ETM Collaboration has started exploratory simulations with four (up, down, strange and charm) unquenched flavours. **II.** Model-independent phenomenological analyses of new-physics effects in flavour physics [4, 63, 143, 144], including in particular B_s -mixing [145], $B \rightarrow D\tau\nu$ decays [146], and global analysis of $\Delta F = 1$ processes in the MFV framework [147] (milestones n. 14-18). Related studies about the physics case of a Super Flavour Factory [148]. **III.** Analysis of recent data collected by KLOE and other low-energy experiments on semileptonic K decays [149]. Evaluation of combined averages for all the quantities relevant to perform stringent tests of the SM, such as the CKM-unitarity test and tests of lepton-flavour universality [150] (milestones n. 7-8). **IV.** Development of effective field theories of QCD with applications to the physics of heavy meson decays, heavy quarkonium [151–155] and quark-gluon plasma (milestones n. 3,4,5). New determination of V_{ub} from semileptonic B decays [156]. Study of implications of the ADS/CFT correspondence for light meson dynamics [157, 158] **V.** Developments of a new effective theory to describe the light scalar-mesons [159] and interpretation of the newly observed heavy mesons in terms of four-quark states [160, 161] (milestone n. 4).

Node No. 6: Poland (University of Silesia [Univ. of Silesia])

The activity of the Polish node concentrated mainly on the realization of the milestones number 1, 3, 4, 6, 7, 10, 12, 14, 15, 16, 17 and 18. One meeting of the working group 6 was co-organized. The meeting gathered not only physicists from FLAVIANet, but a wider group working actively in the field covered by working group 6.

Calculation of the radiative corrections relevant for luminosity monitoring at meson factories and construction of necessary software tools was a subject of papers [184–189] (milestone no. 12). In [184, 185, 188] the complete virtual QED contributions to Bhabha scattering due to vacuum polarization effects in photon propagation were derived. The result was applied to hadronic corrections and to heavy lepton and top quark loop insertions. The first complete estimate of their net numerical effects for both small and large angle scattering at typical beam energies of meson factories, LEP, and the ILC was given. The determination of the infrared singularities of massive one-loop 5-point functions with Mellin-Barnes (MB) representations was discussed in [186, 187]. Analytical reductions of one-loop tensor integrals with 5 and 6 legs to scalar master integrals was performed in [189]. The reductions are expressed in a compact form, and have been implemented in a Mathematica package called hexagon.m.

Associated production of the top quark pair and light Higgs boson at the future International Linear Collider was discussed in [190, 191] (milestones no. 17,18). The background effects have been shown by comparing cross sections of three reactions, which represent different detection

channels of $e^+e^- \rightarrow t\bar{t}H$, calculated with the complete sets of the lowest order Feynman diagrams with the corresponding signal cross sections calculated with the diagrams of associated production and decay of off mass shell top quark pair and Higgs boson only.

The current status of `carlomat`, a program for automatic computation of the lowest order cross sections of multi-particle reactions was presented in [192] (milestones no. 12,17,18). The results of comparisons with other multipurpose Monte Carlo programs were shown.

Mass range of the charged Higgs boson in the 2HDM with explicit and spontaneous CP violation was discussed in [193] (milestone no. 18). It was shown that it may help to distinguish between those types of the CP violation. Constraints on M_H^+ in the CP conserving 2HDM(II) were shown. The physics case of the International Linear Collider was presented in [194] (milestone no. 18). In [195] the introduction to the conference Photon 2007, devoted to the photon interaction with hadrons was presented (milestones no. 6,18). Open problems relevant for a search for a new physics were discussed, among them hadronic contribution to $g-2$ for muon.

Charge asymmetry in processes $\gamma\gamma \rightarrow \ell + \ell^- + \nu's$ was considered in [196] (milestone no. 18). Effects sensitive to New Physics were found.

The report [197] presents flavour related issues in the production and decays of heavy states at LHC, both from the experimental side and from the theoretical side (milestones no. 10,14,15). It contains a review of top quark physics, and a discussion of flavour aspects of several extensions of the Standard Model, such as supersymmetry, little Higgs model or models with extra dimensions. This includes discovery aspects as well as measurement of several properties of these heavy states.

The article [198] presents a study of the anomalous Wtb coupling effect on the $B \rightarrow X_s\gamma$ branching ratio (milestones no. 3,10,14,15). The considered couplings are introduced as parts of gauge-invariant dimension-six operators that are built out of the Standard Model fields only. Bounds on the corresponding Wilson coefficients are derived.

The present status of the physics program, which led to the development of the Monte Carlo event generator PHOKHARA was described in [199,200] (milestones no. 1,4,6,7,12,16). In [200] an improved description of four-pion production in electron-positron annihilation and in tau lepton decays is presented. Predicting tau decay distributions from e^+e^- data and comparing these predictions with ALEPH and CLEO results, the validity of isospin symmetry is confirmed within the present experimental errors. Special emphasis is put on the predictions for $\omega(\rightarrow \pi^+\pi^-\pi^0)\pi$ in e^+e^- annihilation and in tau decay.

In [201] the program BOKASUN for fast and precise evaluation of the Master Integrals of the two-loop self-mass sunrise diagram for arbitrary values of the internal masses and the external four-momentum was presented (milestone no. 12).

The calculational precision of $e^+e^- \rightarrow \tau^+\tau^-$ and $e^+e^- \rightarrow \mu^+\mu^-$ production cross-sections in electron-positron annihilations at $\sqrt{s} = 10.58$ GeV was studied in [202] for the KKMC Monte Carlo simulation program (milestones no. 12,16).

A review the main ideas and constraints which shaped the program PHOTOS of today and enabled it widespread use was presented in [203] (milestones no. 7, 10, 12, 16). The importance of aspects related to reliability of program results: event record contents and implementation of channel specific matrix elements were emphasized.

Node No. 7: Nordic (Lund University [ULUND])

In this period we have contributed to milestones 1,2,7,8,9,10,11,13 which span the working groups 1,2,4 and 5. The publications [204–210] which appeared in the first period as preprints have now been published.

The new work in this period is in several main areas. First we have been involved in improving the theoretical predictions for $K_{\ell 3}$ decays and their relevance for the determination of the CKM element V_{us} by computing the isospin breaking correction to NNLO in Chiral Perturbation Theory [211] and by participating in the overall discussion in the kaon working group [150]. It was found that the total effect of isospin breaking at NNLO is small since there were two compensating effects, a larger value of $m_u - m_d$ is needed at NNLO but the NNLO in $K_{\ell 3}$ lowers the isospin breaking correction. Effects on the Callan-Treiman point at NNLO were also discussed. The second area has been in working in effects relevant in nonleptonic weak decays. A new type of Penguin effect was studied in $K \rightarrow \pi\pi$ decays [212] This offshell chromomagnetic dipole increases the effect of Q_6 in this decay by about 5%.

The form-factors in semileptonic B_q to D_q decays have been studied as regards to the chiral corrections coming from chiral loops. These corrections were calculated for $1/m_Q$ suppressed operators and an extraction procedure from lattice QCD results suggested [167].

The last main area studied was the purely hadronic one where results at NNLO in ChPT for $\eta \rightarrow 3\pi$ were discussed [213] and the progress in the new dispersion analysis of πN scattering was presented in [214, 215]. This is part of an update of the old Karlsruhe-Helsinki analysis of the then existing πN data set.

Node No. 8: France (Centre National de la Recherche Scientifique [CNRS])

The research of the node addressed milestones 2,4,5,7,10,11,14,15,16,19.

In the strong sector of the SM, the dispersive representation of scalar and vector $K\pi$ form factors has been investigated together with the KTeV collaboration exploiting data on $K_L \rightarrow \pi^\pm \mu^\mp \nu$ decays. The value of the scalar form factor at the Callan-Treiman point provides a stringent test of the Standard Model and allows for a comparison with the lattice QCD calculations. The dispersive representation of the scalar form factor has been matched to its expression at two loops in Chiral Perturbation Theory, providing further tests of this representation [216]. The vector form-factor $f_+^{K\pi}(t)$ was reconstructed thanks to analyticity, detailed experimental inputs on πK scattering in the P -wave and asymptotic constraints from QCD. The result was compared to new data on $\tau \rightarrow K\pi\nu_\tau$ decays [217]. Recent experimental and theoretical improvement on hadronic τ decays have allowed a reassessment of the value of $\alpha_s(M_\tau)$ using Finite-Energy Sum Rules, with a detailed comparison of the two main approach to treat the perturbative series for the Adler function [218]. The relations between dispersion relations and Chiral Perturbation Theory have been investigated [219] and properties of the η -meson (decay constant, $\eta\pi$ scattering) have been studied in the framework of Resummed Chiral Perturbation Theory [220, 221]. A study of the properties of resonances with lattice simulations has been proposed, based on the finite-volume dependence of the energy levels [222, 223]. The integral equation for the two-point quark gauge invariant Green function has been studied in the more specific case of two-dimensional QCD in

the large- N limit, allowing a numerical solution for the corresponding spectral functions [224]. Lattice computations were performed to extract moments of meson distribution functions [225] and nucleon and Δ masses [226] with $N_f = 2$ twisted mass fermions.

In the electroweak sector of SM, preliminary lattice results on the D -meson decay constant and $D \rightarrow \pi \ell \nu$ form factors with $N_f=2$ Wilson quarks [227]. The experimental data on $D \rightarrow K \ell \nu$ were exploited to extract the $DD_s^* K$ coupling and to test various extrapolation scheme of form factors beyond the range experimentally accessible [228]. The QCD light-cone sum rules for $B \rightarrow \pi$ form factors has been reconsidered and updated with the inclusion of gluon radiative corrections to the twist-2 and twist-3 terms and updated input values [104]. The chiral corrections to the matrix elements of the $\Delta B = 0$ four-quark operators, relevant to the studies of the ratios of lifetimes of heavy-light mesons as well as to the power corrections to the inclusive semileptonic heavy-to-light decays, have been computed to help lattice extrapolations of these quantities [168]. $B \rightarrow K \eta^{(\prime)}$ decays have been studied within QCD factorisation, using the nonet symmetry to determine matrix elements of pseudoscalar densities for pseudoscalar mesons [229]. $B \rightarrow K \eta'$ predicted branching ratios are 20-30% lower than experiment, a discrepancy solved if the $B \rightarrow \eta'$ form factor is increased by 40% with respect to the value according to the nonet symmetry. The radiative $B \rightarrow K \eta^{(\prime)} \gamma$ decays have also been studied in corners of the Dalitz plot where K or η mesons are soft where heavy meson chiral perturbation theory applies, with a good agreement with experimentally measured partially integrated rates [230].

Beyond the Standard Model, a Bayesian analysis was performed to combine the available experimental information on B_s mixing, including the tagged analyses of $B_s \rightarrow J/\Psi \phi$ by the CDF and D0 collaborations. The resulting discrepancy with respect to Standard Model expectation is a hint of New Physics disfavouring Minimal Flavour Violation [145].

Node No. 9: Switzerland (Universität Bern [UBERN])

The research of the node addressed milestones no. 1,2,3,6,7,12,13,14,15 which span the topics of all working groups. In [248] the exclusive rare decays $B \rightarrow V \gamma$ have been analyzed. In particular the hard-scattering kernels of O_7 and O_8 were calculated at NNLO, approximations for the O_1 contribution were included and phenomenological consequences were discussed. Virtual and Bremsstrahlung fermionic corrections to the (O_7, O_8) - interference which contribute to the branching ratio for $B \rightarrow X_s \gamma$ at NNLL level were analyzed in [249].

Using the published KTeV samples of $K_{L e3}$ and $K_{L \mu3}$ decays, an analysis of the scalar and vector form factors based on the dispersive parameterization is performed. The correlations between the two form factors are studied in detail [150, 216].

The evaluation of the radiative corrections to all four $K \rightarrow 3\pi$ decays in the framework of NR effective field theory has been finalized [250]. The code has already be implemented by the NA48/2 collaboration in their data analysis.

Supersymmetric extensions of the standard model with minimal flavour violation (MFV) have been studied. In [251] it has been shown that requiring MFV is enough to protect the proton from decaying, without having to introduce the R-parity symmetry. In [252] the running of these models has been analyzed in detail and it has been shown that the MFV parameters display a quasi fixed-point behaviour.

The NA48/2 members of our node have completed the analysis of the 2003 data set of $K^\pm \rightarrow \pi^\pm \gamma \gamma$, and have delivered a measurement of the branching ratio and the \hat{c} coupling constant of χ PT.

Node No. 10: Austria (Universität Wien [UNIWIEN])

In the second year, the research of the node was related to the topics of working groups no. 1,2,4,5. The work of the Viennese group of this node addressed milestones no. 1,2,7: Using chiral perturbation theory, large N_c estimates for the determination of low-energy couplings and dispersive methods, we have discussed the standard model predictions for the scalar form factors of $K_{\ell 3}$ decays [253]. Our analysis includes a discussion of isospin violating effects of strong and electromagnetic origin. The radiative corrections to all $K_{\ell 3}$ modes to leading non-trivial order in chiral effective field theory have been calculated [254], working with a fully inclusive prescription of real photon emission. New results for the $K_{\mu 3}$ modes were obtained and previous results on the $K_{e 3}$ modes were updated, providing an important theoretical input for the extraction of the CKM matrix element V_{us} from $K_{\ell 3}$ decays. A paper on the dispersive approach to chiral perturbation theory has recently been completed [219]. These methods are presently applied in an investigation of cusp effects in $K \rightarrow 3\pi$ decays.

The papers of the Slovenian part of this node were related to milestones no. 4,11,13,14,15,18,19: The chiral corrections to the matrix elements of the $\Delta B = 0$ four-quark operators which are relevant to the studies of the ratios of lifetimes of heavy-light mesons as well as to the power corrections to the inclusive semileptonic heavy-to-light decays were determined in [168]. The Dalitz plots of the decays $B \rightarrow \eta K \gamma$ and $B \rightarrow \eta' K \gamma$ were investigated in [230], using the combined heavy meson, large energy, and chiral Lagrangian theories. Motivated by the possible sensitivity to the presence of new physics in $B_q \rightarrow D_q \tau \nu$ decays, we have investigated the effects of chiral corrections to the relevant (scalar) form factor [167]. The explicit chiral behaviour of the computed chiral corrections can be used to guide future lattice computations in approaching the physical regime for the light quark masses. In [255], a constraint on the CKM quark mixing parameters $\bar{\rho}$ and $\bar{\eta}$ was obtained from $B \rightarrow K^+ \pi$. In [169] we investigate the Yukawa sector for up-like quarks in Lee's version of the littlest Higgs model. We derive general quark mass and mixing formulae and study leading order contributions due to non-zero light quark masses. Relying on the unitarity of the generalized quark mixing matrix we obtain corrections to the CKM matrix elements. In this model, flavour changing neutral currents appear at the tree level. Predictions for x_D , $D \rightarrow \mu^+ \mu^-$ and the $t \rightarrow c(u) Z$ transitions are discussed. A detailed review of the potential of a Super Flavour Factory (SFF) for searches of new physics was presented in [256]. The SFF is envisioned to be a crucial tool for essential studies of flavour physics in the LHC era.

Node No. 11: Germany–North (Stiftung Deutsches Elektronen Synchrotron [DESY])

The non-relativistic effective Lagrangian approach has been applied to study of $K_L \rightarrow 3\pi$ and $\eta \rightarrow 3\pi$ decays [257]. The possibility of extracting $\pi\pi$ scattering lengths from these decays has been investigated. The approach has been further extended to include electromagnetic effects in the charged as well as neutral kaon decays [250]. The treatment of unstable states and the ex-

traction of phase shifts in lattice QCD have been studied by using effective field theory methods in a finite volume [222, 223, 258]. Nucleon-nucleon scattering at next-to-leading order in chiral EFT is analysed on the lattice. Using the same method, the properties of neutron matter close to the unitarity limit are worked out [259, 260].

The twisted mass formulation of lattice QCD was applied in [226] for the computation of the light baryon masses and to charmed mesons [261], while in [12] the simulation and analysis details of a prior publication [262] were given. In [263] new results concerning the spectrum of QCD with one quark flavor were presented; a summary was given in [264].

Variants of applying non-perturbative HQET on the lattice for precision B-physics have successfully been tested in quenched computations [85, 265, 266]. Preparations for their application with two flavours of dynamical fermions have been carried out [267, 268]. The renormalization and improvement of the light quark sector of the two flavour theory was investigated [269, 270].

Lattice spacing effects in pion scattering have been included in the chiral perturbation expansion [271]. Wilson fermion simulations with “nHYP smearing” have been applied in the epsilon regime [272] with a new reweighting technique to reach very small quark masses [273].

2 Publications

The FLAVIANet members wrote the scientific papers listed below during the reporting period. Only papers which are published or submitted for publication are listed. Publications unrelated to the topics mentioned in Annex I of the FLAVIANet contract are not included. Experimental papers are only listed if FLAVIANet members were involved in the presented analyses. We list joint publications involving several FLAVIANet nodes in Sect. 3.5.

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3 Conferences, Workshops and General Networking

The FLAVIANet nodes have organised several events devoted to common research and scientific exchange. The major meetings were the *Euro-Flavour07* in Orsay and *Euro-Flavour08* in Durham. These conferences are described in the following two sections. Sect. 3.3 summarises other conferences and workshops organised at one of the nodes, if they were totally or in part devoted to flavour physics. Sect. 3.4 is devoted to other conferences and workshops, at which results from FLAVIANet were presented. In Sect. 3.5 we summarise the individual networking activity related to research. Finally we justify changes to our original schedule.

3.1 Euro-Flavour 07

The conference *Euro-Flavour07* took place at the Univ. Paris-Sud 11 in Orsay from 14-16 Nov 2007. The local organisers were D. Bećirević, S. Descotes-Genon, B. Moussallam, M.H. Schune and A. Stocchi (node 8). The format of this three-day conference was rather similar to that of the 2006 conference. There were 111 participants (among which a third were students, for which a special reduced fee was proposed) and 37 plenary talks, which were :

Speaker	talk title
B. Ananthanarayan	<i>Puzzles of excited charmed meson masses</i>
P. Beltrame	<i>New measurements of $\sigma(e^+e^- \rightarrow \pi^+\pi^-\gamma)$ cross section</i>
J. Bijnens	<i>$\eta \rightarrow 3\pi$ at two loops in ChPT</i>
H. Czyz	<i>Recent developments in the PHOKHARA generator</i>
B. Duling	<i>Lepton flavour violation in the littlest Higgs model with T-parity</i>
A. Fuhrer	<i>Cusp effects in $K \rightarrow 3\pi$ decays</i>
B. Haas	<i>On D-decays on the lattice</i>
C. Haefeli	<i>Integrating out strange quarks in ChPT</i>
J. Heitger	<i>Quark mass dependence of the heavy-strange meson decay constant in quenched QCD</i>
A. Hoang	<i>QCD factorisation for top mass reconstruction</i>
T. Hurth	<i>Rare decays with focus on electromagnetic corrections on $B \rightarrow X_s l^+ l^-$</i>
M. Jamin	<i>α_s and the tau hadronic width</i>
J. Kamenik	<i>Lattice chiral extrapolations in processes of positive and negative parity heavy mesons</i>

K. Kampf	π^0 decays
M. Kolesar	Aspects of resummed ChPT
E. Kou	Anomalous enhancement of a penguin hadronic matrix element in $B \rightarrow K\eta'$
L. Lellouch	Light pseudoscalar mesons in 2+1 flavor QCD
V. Lubicz	Light-quark masses and pseudoscalar decay constants from $N_f = 2$ lattice QCD with twisted mass fermions
J. Matias	The Transverse Asymmetry A_T^2 of $B_0 \rightarrow K^{*0}(\rightarrow K\pi)\ell^+\ell^-$ in SM and supersymmetry
B. Moussallam	Light two-particle matrix elements of the $S = 1$ vector current
M. Oertel	Testing non-standard couplings to Z
N. Offen	V_{ub} and $B \rightarrow \pi$ form factors from light-cone sum rules revisited
E. Passemar	Matching two-loop ChPT with the dispersive representation of the $K\pi$ scalar form factor
M. Pennington	Can experiment distinguish between a molecule and an underlying quark state ?
S. Peris	What is resonance saturation ?
A. Pineda	$1/N_c$ and $1/n$ preasymptotic effects in current-current correlators
H. Sazdjian	Integral equation for gauge invariant quark Green's function
O. Schneider	LHCb
F. Schwab	Flavour physics and CP violation in the minimal 331 model
I. Scimemi	The jet mass of the top quark : two-loop properties
P. de Simone	Precision tests from kaon decays
C. Smith	Minimal flavour violation, seesaw and R-parity
A. Stocchi	Super flavour factories
D. Straub	$SO(10)$ SUSY GUTs with family symmetries: the test of FCNC
S. Trine	The Higgs sector of the MSSM and $B-\bar{B}$ mixing for large $\tan\beta$
L. Vernazza	Hadronic B decays on the MSSM at with large $\tan\beta$
J. Virto	Measuring ϕ_s with $B \rightarrow VV$ decays

A special session was devoted to two main experiments which will play a major role in flavour physics in the next years. O. Schneider (CERN) gave an overview of the processes to be studied at LHCb, whereas A. Stocchi (LAL Orsay) provided an introduction to the two projects of Super Flavour Factory currently under discussion. An open discussion was organised so that the participants of the conference could improve their knowledge of these two major experimental projects in the field.

Time was also provided for the working groups. A special satellite meeting was organised for WG5 (Lattice) on Tuesday afternoon at LPT Orsay, before the opening of the conference. It was devoted to the determination of chiral low-energy constants from lattice QCD and to the averaging procedure of results from different lattice groups. In addition, during the conference, on Wednesday afternoon, parallel sessions were organised for the six working groups. WG1 dis-

cussed experimental and theoretical issues on K_{l2} and K_{l3} decays. WG2 focused on inclusive and exclusive semileptonic $b \rightarrow c$ transitions. WG3 addressed issues in the theoretical description of quarkonia and on the use of resonances for hadronic τ decays. WG4 investigated the interplay of large- N_c models of resonances with the determination of low-energy constants. WG5 discussed the use of effective theories (ChPT and HQET) on the lattice, and kept on discussing the issues raised in the Tuesday satellite meeting. WG6 studied issues related to the PHOKARA Monte-Carlo generator. The outcome of these discussions was presented by the WG leaders on Friday afternoon in a dedicated plenary session.

In addition, during the time of the conference, an outreach conference was proposed in French by P. Roudeau (LAL Orsay) for the researchers and students of the campus of Orsay, but also for the inhabitants of the neighbouring towns. This colloquium on the history and the present of particle physics was organised in the framework of the local committee of the French Physical Society (SFP). This successful conference prompted the organisation of a second colloquium two months later in the same framework, more focused on the LHC Physics, by M. Giovannozzi (CERN).

3.2 Euro-Flavour 08

The conference *Euro-Flavour08* took place at the Institute for Particle Physics Phenomenology of Durham University from 22nd to 26th September 2008 with Michael Pennington and Linda Wilkinson as the local organisers. One day of the 4.5 days was devoted to the Midterm Review. There were 64 participants. All (but one) of the young researchers funded by Flavianet attended. The annual conference involved 38 talks. One of these by S. Descotes-Genon was a reminiscence of Jan Stern, a founder member of our European collaboration, who sadly died a few months ago. The talks are set out in the table.

Speaker	Talk title
W. Altmannshofer	<i>Low energy probes of CP violation in a flavour blind MSSM</i>
E. Ben-Haim	<i>Review of B-physics experiment</i>
F. Bernardoni	<i>ChPT in the mixed regime</i>
A. Bharucha	<i>Asymmetries in the decay mode $B \rightarrow K^* \mu^+ \mu^-$</i>
S. Bifani	<i>Chiral Perturbation Theory tests at the NA48/2 experiment</i>
D. Boito	<i>$K\pi$ vector form factor, dispersive constraints and $\tau \rightarrow \nu K \pi$ decays</i>
R. Boughezal	<i>Towards a complete NNLO prediction for $B \rightarrow s\gamma$ decay rate</i>
O. Cata	<i>α_s from tau decays: evidence for duality violations?</i>
A. Ceccucci	<i>Plans for NA62 experiment</i>
A. Crivellin	<i>New Constraints on the squark-mass-matrices of the MSSM</i>
G. Colangelo	<i>Review of lattice Methods and results II</i>

P. Colangelo	<i>Review of quarkonium physics</i>
H. Czyz	<i>Review of Monte Carlo tools</i>
G. D'Ambrosio	<i>Review of kaon physics</i>
S. Descotes-Genon	<i>Memories of Jan Stern</i>
M. Donnellan	<i>Moments of light-Cone distribution amplitudes from lattice QCD</i>
R. Escribano	<i>Derivation of the η' gluonic content from the J/ψ and ϕ meson decays</i>
C. Farrell	<i>Top pair associated Higgs production at the ILC</i>
P. Fritzscht	<i>Non-perturbative tests of HQET in two-flavour QCD</i>
M. Gorbahn	<i>Rare kaon decays</i>
J. Ilic	<i>Hadronic charmless threebody B decays at BaBar</i>
S. Ivashyn	<i>Momentum dependence of $a_0(980)$ and $f_0(980)$ meson interactions in RChT face the KLOE data</i>
I. Jemos	<i>Determination of low energy constants and testing ChPT at NNLO</i>
A. Jüttner	<i>Review of lattice methods and results I</i>
J. Kamenik	<i>Review of B-physics theory</i>
K. Kampf	<i>Decay $\pi^0 \rightarrow \gamma\gamma$ in ChPT</i>
L. Lellouch	<i>The light hadron spectrum in QCD</i>
P. Masjuan	<i>A rational approach to resonance saturation</i>
V. Mateu	<i>Heavy quark vacuum polarization function at $O(\alpha_s^2)$ and $O(\alpha_s^3)$</i>
H. Neufeld	<i>Electromagnetic effects in $K_{\ell 3}$ decays</i>
S. Nicotri	<i>Studies in holographic QCD</i>
E. Passemar	<i>Robustness of the dispersive representation of $K_{\ell 3}$ form factors and analysis of KTeV data</i>
A. Pich	<i>Review of tau-physics</i>
G. Rodrigo	<i>A duality relation between loops and trees</i>
I. Rosell	<i>Resonance saturation at NLO</i>
J.J. Sanz-Cillero	<i>Some uses of Pade approximants: the vector form factor</i>
S. Wiesenfeldt	<i>Large quark mixing in $SO(10)$</i>
M. Zdrahal	<i>Dispersive approach to the cusp in $K \rightarrow 3\pi$</i>

The detailed schedule can be found at <http://www.ippd.dur.ac.uk/Workshops/08/euroflavour08>. We devoted a session to each of the Working Groups: Kaon physics, B -physics, tau-charm physics, Lattice methods and results, Monte Carlo methods and tools, and Analytic approaches to QCD. Each session began with a review of progress in the field, and where appropriate the interplay of theory and experiment, as well as presenting open issues.

The Mid-term Review consisted of an overview of the Network and its management by A. Pich, its training and networking by N. Brambilla, of recruitment by M.R. Pennington and a presentation on the research reporting mechanism by U. Nierste. All the participating Experienced Researchers and Early Stage Researchers funded by Flavianet gave individual presentations about their scientific and cultural experience, and the coordinator of each of the 11 Nodes of the Network reviewed progress over the past two years. The EU was represented by their consultant Prof. Fabrizio Fontana.

3.3 Conferences and workshops within FLAVIANet

Several conferences and workshops took place in the FLAVIANet nodes. Here we list both genuine FLAVIANet meetings and international conferences and workshops organised by FLAVIANet members at their home institutions.

Node no.	Conference/Workshop
1	<i>SuperB Workshop VI: New Physics at the Super Flavour Factory SuperB</i> , 7th - 15th January 2008, Valencia (Spain) http://ific.uv.es/superb
1	<i>10th International Workshop on Neutrino Factories, Super beams and Beta beams</i> , 30th June - 5th July 2008, Valencia (Spain) http://ific.uv.es/nufact08
2	<i>HADRONTH07: Workshop of the HADRONTH network of the HADRONPHYSICS I3 EU project</i> , 1st - 4th October 2007, Barcelona, Spain, http://www.ecm.ub.es/bruno/hadron07/
2	<i>School on Flavor Physics</i> , 13th - 25th July 2008, Benasque, Spain, http://benasque.ecm.ub.es/2008flavor/2008flavor.htm
5	<i>Flavianet Kaon Workshop</i> 12th - 14th June 2008, Anacapri (Italy) http://flavianetcapri.na.infn.it
5	<i>Second Workshop on Theory, Phenomenology and Experiments in Heavy Flavour Physics</i> 16th - 18th June 2008, Anacapri (Italy) http://web.na.infn.it/index.php?id=b-physics-capri
5	<i>V Italian Informal Meeting on B Physics</i> 3rd-4th April 2008, Cagliari (Italy) http://www.ca.infn.it/gruppo1/IncontriB_08/index.html
5	<i>International Workshop on e^+e^- collisions from Φ to Ψ</i> 7th-10th April 2008, Frascati (Italy) http://www.lnf.infn.it/conference/phipsi08/
5	<i>XIII LNF Spring School in Nuclear, Subnuclear and Astroparticle Physics</i> 12th -16th May 2008 Frascati (Italy) http://www.lnf.infn.it/conference/lnfss/08/

6	<i>International Linear Collider ECFA Workshop</i> , 9-12 June 2008, Warsaw, Poland http://ecfa2008.fuw.edu.pl/
8	<i>Lattice Simulations of Quantum Fields</i> , 26th March - 1st April 2008, LPT Orsay, http://www.th.u-psud.fr/block-course/
11	<i>Sixth International Workshop on Chiral Dynamics (Theory and Experiment)</i> , 6th-10th July 2009, Berne, Switzerland, http://www.chiral09.unibe.ch
11	<i>Hadron Physics Summer School</i> , 11th - 15th August, Bad Honnef, Germany, http://www.fz-juelich.de/ikp/hpss2008
11	<i>MENU2007 – 11th International Conference on Meson-Nucleon Physics and the Structure of the Nucleon</i> , 10-14 September 2007, Jülich, Germany, http://www.fz-juelich.de/ikp/menu2007
11	<i>39. Arbeitstreffen Kernphysik</i> , 21-28 February 2008, Schleching, Germany, http://www-win.gsi.de/AK-Schleching2008
11	<i>QCD, spin physics and chiral dynamics in nuclei Session, International Conference on Particles And Nuclei (PANIC08)</i> , November 2008, Eilat, Israel, http://www.weizmann.ac.il/conferences/panic08
11	<i>NSTAR 2007 – Workshop on the Physics of Excited Nucleons</i> , 5-8 September 2007, Bonn, Germany, http://nstar2007.uni-bonn.de
11	<i>LIGHT CONE 2008 – Relativistic Nuclear and Particle Physics</i> , 7-11 July 2008, Mulhouse, France http://clrwww.in2p3.fr/LC2008
11	<i>Vth International Conference on Quarks and Nuclear Physics (QNP08/09)</i> , 2008/2009, Beijing, China, http://tpcsf.ihep.ac.cn/QNP09/index.htm
11	<i>Perspectives and challenges for full QCD lattice calculations</i> , 5th - 9th May 2008, Trento, Italy, http://www.ect.it

3.4 Other conferences and workshops

Below we list the international conferences and workshops at which FLAVIA_{net} researchers have presented their scientific results. Several of these conferences were attended by a large number of FLAVIA_{net} members and were used for networking.

Name	Node no.	Conference/Workshop talk title
Germán Rodrigo	1	HERA and the LHC: 4th Workshop on the implications of HERA for LHC physics, CERN, Switzerland. May 2008. <i>A duality relation between one-loop and phase-space integrals</i>

José Antonio Oller	1	<p>9th DESY Workshop on Elementary Particle Theory: Loops and Legs in Quantum Field Theory, Sonderhausen, Germany. April 2008. <i>From multileg loops from trees (bypassing Feynman's Tree Theorem)</i></p> <p>PHIPSI08: International Workshop on e+e- collisions from Phi to Psi, Frascati, Italy. April 2008.</p> <p>8th International Symposium on Radiative Corrections: Application of Quantum Field Theory to Phenomenology (RADCOR 2007), Florence, Italy. October 2007. <i>Axigluon signatures at hadron colliders</i></p> <p>XII International Conference on Hadron Spectroscopy, Laboratori Nazionali di Frascati, Rome, Italy. October 2007. <i>On the Strangeness -1 Meson-Baryon Spectroscopy</i></p> <p>Scalar mesons and Related Topics $\gamma\gamma \rightarrow \pi\pi$, $f_0(980) \rightarrow \pi\pi$, <i>scalar glueball</i></p>	
Ignasi Rosell	1	<p>Euroflavour 07 - Annual Meeting of the FLAVInet network, Orsay, France (November 2007), <i>Improving the theoretical status of $\pi(K) \rightarrow e\nu_e[\gamma]$</i></p> <p>QCD08: 14th International QCD Conference, Montpellier, France (July 2008), <i>Current correlators and form factors in the resonance region</i></p>	
Oscar Vives	1	<p>PLANCK 2008 From the Planck Scale to the ElectroWeak Scale, Barcelona, Spain. (May 2008). <i>Electric dipole moments from flavoured CP violation in SUSY</i></p>	
Silvia Necco	1	<p>EuroFlavour '07, Univ. Paris-Sud 11, Orsay, France (November 2007). <i>Determining QCD Low-Energy Couplings From Lattice Simulations</i></p> <p>Nobel Laureate Meetings, Lindau, Germany, (June 2008).</p>	
Christoph Haefeli	1	<p>XIII IFT-UAM/CSIC Christmas Workshop, Madrid, Spain, (December 2007).</p>	ER
Jorge Portolés	1	<p>QCD08: 14th International QCD Conference, Montpellier, France (July 2008), <i>Analysis of $\tau \rightarrow \nu_\tau K_S \pi$ Belle data in a chiral framework</i></p>	
Pablo Roig	1	<p>QCD08: 14th International QCD Conference, Montpellier, France (July 2008), <i>Improving the hadronization of QCD currents in TAUOLA</i></p> <p>QCD08: International Workshop on e^+e^- collisions from Φ to Ψ, Frascati, Italy (April 2008), <i>A proposal for improving the hadronization of QCD currents in TAUOLA</i></p>	

Martín González-Alonso	1	QCD08: 14th International QCD Conference, Montpellier, France (July 2008), <i>Determination of chiral low-energy constants from tau data</i>
Antonio Pich	1	PhiPsi08: International Workshop on e^+e^- collisions from Φ to Ψ Laboratori Nazionali di Frascati, Italy (7-10 April 2008), <i>Tau Physics: Theory Overview</i> CPT@ICTP 2008: Workshop on the origins of P, CP and T violation, ICTP, Trieste, Italy (2-5 July 2008), <i>CP Violation in Kaon Decays</i> QCD08: 14th International QCD Conference, Montpellier, France (7-12 July 2008), <i>The Physics of τ decay</i>
Elisabetta Pallante	1	Hadron '07, Frascati National Laboratories, Rome, Italy, (October 2007). <i>The Many Uses of Chiral Effective Theories.</i> EuroFlavour '07, Orsay, France, (November 2007). <i>Analytic approaches to nonperturbative QCD</i> (summary talk- WG4). Lattice 2008, International Conference on Lattice Field Theories, College of William Mary, Williamsburg, Virginia, USA, (July 2008) <i>Searching for the Conformal Window</i> (contribution to Applications beyond QCD).
Albert Deuzeman	1	Lattice 2008, International Conference on Lattice Field Theories, College of William & Mary, Williamsburg, Virginia, USA, (July 2008) <i>The Physics of Eight Flavours</i> (contribution to Applications beyond QCD).
Siebren Reker	1	Lattice 2008, International Conference on Lattice Field Theories, College of William & Mary, Williamsburg, Virginia, USA, (July 2008) <i>Status of the $N_f = 2+1+1$ simulations by the ETM Collaboration</i> (contribution to Hadron spectrum).
Pilar Hernández	1	International Workshop Rencontres de Moriond: Electroweak Interactions and Unified Theories (1-8 March 2008), <i>Organizer</i> XXIII International Conference on Neutrino Physics and Astrophysics (Christchurch, New Zealand, 25-31 May 2008), <i>Outlook: theory</i> 2008 European School on High Energy Physics (Herbeumont-sur-Semois, Belgium, 8-21 June 2008), <i>Lecturer: Neutrino Physics</i> 10th International Workshop on Neutrino Factories, Superbeams and Betabeams (Valencia, Spain, 30 June - 5 July 2008), <i>Organizer, Convenor</i>

Fernando Martínez-Vidal	1	Eighth International Conference on Hyperons, Charm and Beauty Hadrons –BEACH2008– (Columbia, SC, USA, 22-28 June 2008), <i>Unitarity Triangle angles at BaBar</i>
Diego A. Milanés	1	American Physical Society (APS) Meeting (St. Louis, MO, USA, 12-15 April 2008), <i>Dalitz plot Analysis of $D^0 \rightarrow K_S \pi^+ \pi^-$ and $D^0 \rightarrow K_S K^+ K^-$ decays</i> 16th International Conference on Supersymmetry and Unification of Fundamental Interactions –SUSY08– (Seoul, Korea, 16-21 June 2008), <i>Charm Mixing and CP Violation at BaBar Experiment</i>
Neus López-March	1	American Physical Society (APS) Meeting (St. Louis, MO, USA, 12-15 April 2008.), <i>Measurement of γ using a D Dalitz analysis of $B^\pm \rightarrow D^{(*)} K^{(*)\pm}$ decays</i>
J. Prades	2	Topical Workshop on The Muon Magnetic Dipole Moment $(g - 2)_\mu$, 25-26 October 2007, Glasfoc, UK, <i>Status and Prospects of the Hadronic Light-by-Light contribution to muon $g - 2$</i> International Workshop on e+ e- Collisions from Phi to Psi (PHIPSI08), Frascati, Italy, 7-10 Apr 2008, <i>Hadronic Light-by-Light Contribution to Muon $g - 2$: Status and Prospects</i> QCD 08, Montpellier, France 7-12 July 2008, <i>$\sigma \rightarrow \gamma\gamma$ Width from Nucleon Electromagnetic Polarizabilities</i>
A. Pineda	2	International Workshop on Heavy Quarkonium 2007, DESY, Germany, 2007, <i>Inclusive electromagnetic decays of heavy quarkonium</i> FLAVIANet Meeting EUROFLAVOUR07, Paris, France, 2007, <i>Preasymptotic effects in $1/n$ and $1/Nc$ in current-current correlators</i>
A. Parreño	2	Final HadronTH 2007 Collaboration Meeting, Barcelona, October, 1997, <i>Extracting low-energy hadron-hadron physics from LQCD</i> The 20th European Conference on Few-Body Problems in Physics, Pisa, Italy, September 2007, <i>Extracting low-energy hadron-hadron physics from LQCD</i>
A. Ramos	2	International Workshop: Hadrons@FAIR, June 25-27, 2008 FIAS, Universitat Frankfurt am Main, Germany, <i>Open charm mesons in a hot and dense medium</i>
M. Jamin	2	EuroFlavour '07, 14-16 November 2007, Univ. Paris-Sud 11, Orsay, France, <i>α_s and the τ hadronic width</i>
F. Schwab	2	EuroFlavour '07, 14-16 November 2007, Univ. Paris-Sud 11, Orsay, France, <i>Flavour Physics and CP Violation in the Minimal 331 Model</i>

R. Escribano	2	<p>XII International Conference on Hadron Spectroscopy HADRON 07, Laboratori Nazionali di Frascati (Rome), Italy, 8-13 October 2007, <i>On the gluon content of the η and η' mesons</i></p> <p>Workshop on Scalar Mesons and Related Topics SCADRON 70, IST (Lisbon), Portugal, 11-16 February 2008, <i>Update of η-η' mixing from $J/\psi \rightarrow VP$ decays</i></p> <p>International Workshop on e^+e^- collisions from Φ to Ψ PHIPSI08, Laboratori Nazionali di Frascati (Rome), Italy, 7-10 April 2008, <i>Update of η-η' mixing from $J/\psi \rightarrow VP$ decays</i></p>
J. Soto	2	<p>HadronTH 2007 Meeting, October 1-4, 2007, Barcelona, Spain, <i>Charmonium within EFT</i></p> <p>International Workshop on Heavy Quarkonium 2007, 17-20 October 2007, DESY, Hamburg, Germany, <i>Convener of the spectroscopy section</i></p> <p>Second Workshop on Theory, Phenomenology and Experiments in Heavy Flavour Physics. June 16-18 2008, Capri, Italy, <i>Invited to participate in the Round table on Heavy Quarkonium and New Exotic spectroscopy</i></p>
J. Nieves	2	<p>Workshop on Chiral Symmetry in Hadron and Nuclear Physics: Chiral07, Osaka, Japan, 13-16 Nov 2007, <i>Extension to $SU(6)$ and $SU(8)$ Spin-Flavor Symmetries</i></p>
S. Peris	2	<p>EuroFlavour '07, 14-16 November 2007, Univ. Paris-Sud 11, Orsay, France, <i>What is resonance saturation?</i></p> <p>Flavianet Kaon Workshop, Anacapri, Italy, June 2008, <i>What is resonance saturation?</i></p>
J. Matias	2	<p>CERN, Theory Division, LHCb meeting 2007, $B \rightarrow K^*(\rightarrow K\pi)l^+l^-$ in supersymmetry: AT1, AT2 and more</p> <p>2nd Workshop on Flavour Dynamics, Albufeira, Portugal, Nov. 2007, <i>Probing right-handed currents with the AT2 asymmetry</i></p> <p>Euroflavour 07, Orsay, Francia, Nov. 2007, <i>The transverse asymmetry AT2 of $B \rightarrow K^*(\rightarrow K\pi)l^+l^-$ in SM and supersymmetry</i></p> <p>Second Workshop on Theory, Phenomenology and Experiments in Heavy Flavour Physics, Capri, June 2008, <i>Extracting the B_s-\bar{B}_s mixing angle from $B \rightarrow VV$ decays and comments on $B \rightarrow K^*l^+l^-$</i></p>
Roman Zwicky	3	<p>International EuroPhysics Conference on High Energy Physics (EPS-HEP2007), Jul 2007, Manchester, UK <i>Unparticles and CP-violation</i></p>

Frank Close	3	XII International Conference on Hadron Spectroscopy, Oct 2007, Frascati, Italy, <i>π exchange and hybrids: which is more attractive?</i>
Patricia Ball	3	2nd Workshop on Flavour Dynamics, Nov 2007, Albufeira, Portugal, <i>Unparticle Physics</i>
Christopher Sachrajda	3	2nd Workshop on Flavour Dynamics, November 3-10 2007, Albufeira, Portugal, <i>Kaon Physics with Chiral Quarks</i>
Christopher Sachrajda	3	Annual Theory Christmas Meeting on High Energy Physics, December 17-19 2007, Durham, UK, <i>Flavour Physics with Domain Wall Fermions</i>
Jonathan Flynn	3	3rd International Workshop on <i>B</i> Factories and New Measurements, BNM2008, January 24-26 2008, Atami, Japan, <i>Future of Lattice Calculations for <i>b</i> physics</i>
Michael Pennington	3	415th W & E Heraeus Seminar, Mar 2008, St Goar, Germany <i>Quarks and hadrons in strong QCD</i>
Jonathan Flynn	3	HackLatt2008 Workshop, April 1-3 2008, NeSC Edinburgh, <i>Chiral Perturbation Theory</i>
Christopher Sachrajda	3	CERN Theory Institute <i>Flavour as a Window to New Physics at the LHC</i> , May 5 - June 13 2008, Geneva, Switzerland, <i>Kaon Physics with Chiral Fermions</i>
Christopher Sachrajda	3	FlaviaNet Kaon Workshop, June 12-14 2008, Anacapri, Italy, <i>Kaon Physics with Chiral Quarks</i>
Christopher Sachrajda	3	2nd Workshop on Theory, Phenomenology and Experiments in Heavy Flavour Physics, June 16-18 2008, Anacapri, Italy, <i>Theoretical Issues in Lattice Simulations of Heavy Quark Physics</i>
Michaela Albrecht	4	2nd Workshop On Flavour Dynamics, 3-10 November 2007, Albufeira, <i>Challenging $SO(10)$ SUSY GUTs with family symmetries through FCNC processes</i> DPG Frühjahrstagung, 3-7 Mar 2008, Freiburg Planck'08: From the Planck Scale to the Electroweak Scale, Barcelona
Wolfgang Altmannshofer	4	DPG Frühjahrstagung, Freiburg, 3-7 Mar 2008, <i>A Reconsideration of $b \rightarrow s\gamma$ in the Minimal Flavor Violating MSSM</i>
Guido Bell	4	2nd Workshop on Flavour Dynamics, 3-10 Nov 2007, Albufeira, Portugal, <i>NNLO Vertex Corrections in Hadronic B Decays</i> SCET Workshop 2008, 2-5 Apr 2008, Schloss Waldthausen near Mainz, Germany, <i>Modelling light-cone distribution amplitudes from non-relativistic bound states</i>

Paolo Beltrame	4	Deutsche Physikalische Gesellschaft Spring Meeting (Hadrons and Nuclei Session), Darmstadt, Germany <i>Measurement of $\sigma(e^+e^- \rightarrow \pi^+\pi^-\gamma)$ Cross Section with the KLOE detector and extraction of $F_\pi ^2$ and $a_\mu^{\pi\pi}$</i>
Martin Beneke	4	Flavour Physics and CP Violation (FPCP) 2008, Taipei, Taiwan, 5–9 May 2008 <i>Theoretical tools for B-decays: QCD factorization</i>
Joachim Brod	4	DPG Frühjahrstagung, 3-7 Mar 2008, Freiburg, Germany, Elektroschwache Korrekturen zu $K^+ \rightarrow \pi^+\nu\bar{\nu}$
Andrzej Buras	4	2nd Workshop on Flavour Dynamics, Albufeira, Portugal, 3-10 Nov, 2007, <i>FCNC Processes in the Littlest Higgs Model with T-Parity</i> Planck'08, Barcelona, Spain, 19-23 May, 2008, <i>Where to expect New Physics in Flavour Violating Processes</i> 2nd Capri Workshop on Theory, Phenomenology and Experiments in Heavy Flavour Physics, Capri, Italy, 16-18 Jun, 2008, <i>Few Messages on FCNC beyond MFV</i>
Achim Denig	4	International Workshop on e+e- Collisions from Φ to Ψ , 7-10 Apr 2008, Frascati, Italy, <i>BABAR Results on Hadronic Cross Section with ISR</i> International Workshop on Hadron Electromagnetic Form Factors, 12-23 May 2008, Trento, Italy, <i>Measurement of Timelike Form Factors using ISR</i>
Björn Duling	4	Symposium - Symmetries and Phases in the Universe, Irsee, Germany, 23–25 Jun 2008, <i>Posters: The Littlest Higgs without and with T-Parity, Flavour Physics in the Littlest Higgs with T-Parity</i>
Andre Hoang	4	RadCor 2008, 1-5 Oct 2007, Florence, Italy, <i>QCD Factorization for Top Quark Mass Reconstruction</i> International Conference on Flavor Dynamics, 26-30 Nov 2008, Albufeira, Portugal, <i>Factorization for Top Quark Mass Reconstruction: Part I</i> Joint Workshop on V_{ub} and V_{cb} at B-Factories, 14-16 Dec 2008, Heidelberg, Germany, <i>Definition and Extraction of Bottom and Charm Quark Masses</i> LHC-D Workshop on Top Physics, 8-9 Feb 2008, Bad Honnef, Germany, <i>Top Mass Reconstruction: A Factorization Approach</i> SCET 2008 Workshop, 3-5 Apr 2008, Mainz, Germany, <i>Top Jets in the Resonance Region: Factorization & NLL Analysis</i>

		TOP2008, International Conference on Top Quark Physics, May 16-24, 2008, La Biodola, Isola d'Elba, Italy, <i>Top quark mass Reconstruction: Factorization & Mass Definition</i>
Tobias Huber	4	CERN Flavor Theory Institute, May 2 - June 13, 2008, CERN, Geneva, Switzerland, <i>Heavy Quark Masses</i> Rencontres de Moriond 2008: QCD and High Energy Interactions, 8-15 Mar 2008, La Thuile, Italy, <i>Phenomenology of the rare decay $\bar{B} \rightarrow X_s l_+ l_-$</i>
Wolfgang Gradl	4	Workshop on Hard Exclusive Reactions, ECT*, 9-13 Jun 2008, Trento, Italy, <i>Measurement of time-like form factors with BABAR</i>
A. Khodjamirian	4	CERN Theory Institute <i>Flavour as a Window to New Physics at the LHC</i> , 5th May - 13th June 2008, CERN, <i>Applications of QCD Sum Rules to Flavour Physics</i> KITPC Program on <i>Advanced Topics in Flavor Physics</i> , 8-29 Jul 2008, Beijing, China, <i>Applications of QCD Sum Rules to Flavour Physics</i>
Yuichiro Kiyo	4	Radiative Corrections for the LHC and ILC, 14-16 May 2008, The State University of New York, Amherst, New York. <i>N^3LO $t\bar{t}$ threshold cross section</i>
Wolfgang Kluge	4	PHIPSI08, International Workshop on e^+e^- collisions from Φ to Ψ , 7-10 Apr 2008, Frascati, Italy, <i>Initial State Interaction: A success story</i>
Johann Kühn	4	PHIPSI08, International Workshop on e^+e^- collisions from Φ to Ψ , 7-10 Apr 2008, Frascati, Italy, <i>Precise Determinations of the Strong Coupling Constant</i> Loops and Legs 2008, 20-25 Apr 2008, Sondersheim, Germany, <i>Multi-Loop Calculations, Quark Masses and the Strong Coupling Constant</i>
Thomas Mannel	4	Continuous Advances in QCD (CAQCD-08), 15-18 May, 2008, Mineapolis, USA, <i>Hadronic Z- and τ-Decays in Order α_s^4</i> KITPC Program on <i>Advanced Topics in Flavor Physics</i> , 23 Jun. - 4 Jul 2008 Beijing, China, <i>Minimal Flavour Violation and Beyond</i>
Ulrich Nierste	4	2nd Workshop on Flavour Dynamics, 3-10 Nov 2007, Albufeira, Portugal, <i>CP violation in B_s mixing: SM and new physics</i> LHCb Heidelberg Workshop 2008, 12-14 Mar 2008, Neckarzimmern, Germany, <i>Constraining New Physics with B Mesons</i> V Incontro sulla Fisica del B, 3-4 Apr 2008, Cagliari, Italy, <i>Probing new physics with B_s decays</i>

Christoph Reisser	4	Second Workshop on Theory, Phenomenology and Experiments in Heavy Flavour Physics, 16-18 Jun 2008, Anacapri, Italy, <i>Higgs hunting with B decays</i>
Maximilian Stahlhofen	4	International Linear Collider Conference, June 9-12, 2008, Warsaw, Poland, <i>Finite Lifetime Effects in Top Quark Pair Production at Threshold</i>
Matthias Steinhauser	4	DPG Frühjahrstagung 2008, March 3, 2007, Freiburg, Germany <i>Ultrasofte Renormierung der Potentiale in $vNRQCD$</i>
Leonardo Vernazza	4	International Workshop on Heavy Quarkonium 2007, 17-20 Oct 2007, DESY Hamburg, Germany, <i>Quark masses and α_s from $R(s)$</i> Continuous Advances in QCD, 15-18 May 2008, University of Minnesota, USA, <i>Heavy Quark Masses</i>
Susanne Westhoff	4	DPG Frühjahrstagung, Freiburg, Germany, 3-7 Mar 2008 <i>$B \rightarrow X_{c,j}K$ decays revisited</i> Workshop on Flavour Dynamics, 4-10 Nov 2007, Albufeira, Portugal, <i>Charged-Higgs Effects in Semileptonic $B \rightarrow \tau$ Decays</i>
Nora Brambilla	5	Frühjahrskonferenz der Deutschen Physikalischen Gesellschaft, 3-7 Mar 2008, Freiburg, Germany <i>Geladene Higgsbosonen in $B \rightarrow D\tau\nu$: Differentielle Zerfallsraten</i> II Workshop on Heavy Flavour Physics (Capri, Italy, 16-18 June 2008) <i>Heavy Quarkonium and exotic states</i> Workshop on Quark Gluon Plasma and Spectral Functions (BNL, USA, April 23-25 2008) <i>$QQ\bar{b}$ and QQQ potentials at $T=0$</i>
Antonio Vairo	5	II Workshop on Heavy Flavour Physics (Capri, Italy, 16-18 June 2008) <i>Heavy Quarkonium and exotic states</i> Workshop on Quark Gluon Plasma and Spectral Functions (BNL, USA, April 23-25 2008) <i>Static $QQ\bar{b}$ pairs at finite temperature</i> QWG 2007 (DESY, Germany, 17-20 Oct 2007) <i>The QCD static potential at N^4LO</i>
Luca Silvestrini	5	Flavour as a Window to New Physics at the LHC (CERN, Switzerland, 5 May -13 June 2008) <i>Theory Issues in Measuring γ</i> II Workshop on Heavy Flavour Physics (Capri, Italy, 16-18 June 2008) <i>First evidence of new physics in B_s mixing and its implications</i> Lattice 2008, (Williamsburg, USA, 14-19 July 2008) <i>Lattice QCD and New Physics searches: present and future</i>

Fulvia de Fazio	5	SCET 2008 (Mainz, April 2008) <i>SCET sum rules for $B \rightarrow P$ and $B \rightarrow V$ transition form factors</i> QCD 2008 (Montpellier, July 2008) <i>New Open and Hidden Charm Spectroscopy</i>
Javier Virto	5	QCD 2008 (Montpellier, July 2008) <i>Pade Unitarizations: a critical look</i>
Jernej Kamenik	5	II Workshop on Heavy Flavour Physics (Capri, Italy, 16-18 June 2008) <i>MFV at large $\tan \beta$</i> Planck 2008 (Barcelona, Spain, 19-23 May 2008) <i>Low-energy signals of MFV</i>
Gino Isidori	5	NOVE 2008 (Venice, Italy, April 15-18 2008) <i>LFV in charged leptons: the new challenge of flavour physics</i> Symmetries and Phases in the Universe (Kloister Irsee, Germany, 23-25 June 2008) <i>The breaking of CP and Flavour Symmetries</i>
Antonello Polosa	5	International Workshop on e^+e^- collisions from Φ to Ψ (Frascati, Italy, 7 - 10 April 2008) <i>A Theory of scalar mesons</i>
Federico Mescia	5	FPCP 2008 (Taipei, Taiwan, May 5-9 2008) <i>Kaon Physics</i>
Henryk Czyż	6	EuroFlavour '07 14-16 November 2007 Univ. Paris-Sud 11, Orsay <i>Recent developments in the PHOKHARA generator</i> Topical Workshop on The Muon Magnetic Dipole Moment $(g - 2)_\mu$, 25 and 26 October 2007 School of Physics and Astronomy The University of Glasgow <i>Theoretical aspects and status of Monte Carlo programs for Radiative Return analyses</i> PHI PSI 08 International Workshop on e^+e^- collisions from Phi to Psi Laboratori Nazionali di Frascati, Italy, 7 - 10 April 2008 <i>Status of PHOKHARA and its theoretical accuracy</i>
Janusz Gluza	6	Loops and Legs in Quantum Field Theory 20-25.04.2008, Sondershausen, Germany <i>Two-loop Bhabha scattering with $n_f = 2$</i>
Konstantin A. Kanishev	6	FLAVIANet Spring School in Nuclear, Subnuclear and Astroparticle Physics, INFN, Frascati, May 12 - 16, 2008. <i>Charge asymmetry of lepton production</i>
Maria Krawczyk	6	Hiroshima, International Workshop on Physics and Technologies of Laser-Electron Interaction toward the ILC, Japan 11-15 Dec 2007 <i>organiser</i> Hiroshima, International Workshop on Physics and Technologies of Laser-Electron Interaction toward the ILC, Japan 11-15 Dec 2007 <i>Physics at PLC</i>

Mikolaj Misiak	6	<p>Hiroshima, International Workshop on Physics and Technologies of Laser-Electron Interaction toward the ILC, Japan 11-15 Dec 2007 <i>Higgs Physics at PLC</i></p> <p>Warsaw, TOK meeting 13-16 February 2008 <i>Dark Scalar Doublet</i></p> <p>LHC workshop, 21-22 April, Warsaw, <i>organiser</i></p> <p>ECFA-ILC, 9-12 June, 2008, Warsaw, <i>organiser</i></p> <p>ECFA-ILC, 9-12 June, 2008, Warsaw, <i>PLC</i></p> <p>Albuferia, Portugal, "2nd workshop on Flavour Dynamics", 3-10.11, 2007 <i>Perturbative contributions to $B \rightarrow X_s \gamma$</i></p> <p>CERN Theory Institute "Flavour as a Window to New Physics at the LHC", 24-31.05, 2008 <i>Rare B decays: Theory</i></p> <p>Melbourne, Australia, "IX International Conference on Heavy Quarks and Leptons" (HQL08), 5-9.06, 2008 <i>QCD calculations of radiative B decays</i></p>
Zbigniew Was	6	<p>EuroFlavour '07 14-16 November 2007 Univ. Paris-Sud 11, Orsay <i>Spin amplitudes and gauge-invariance: from PHOTOS Monte Carlo to QCD</i></p> <p>PHI PSI 08 International Workshop on e+e- collisions from Phi to Psi Laboratori Nazionali di Frascati, Italy, 7 - 10 April 2008 <i>PHOTOS Monte Carlo and its theoretical accuracy</i></p>
Johan Bijnens	7	<p>FlaviAnet Kaon Workshop, June 12th to 14th 2008, Villa Orlandi, Anacapri, Italy, <i>Isospin breaking at order p^6 in $K_{\ell 3}$ decays</i></p>
S. Descotes-Genon	8	<p>Joint CLEO-BES-BELLE-Babar workshop, 26-27 Nov 2007, Beijing, China, <i>Charm and CKM, now and in the future</i></p> <p>1st workshop of the French-China Particle Physics Laboratory, 14-18 Jan 2008, Marseille, France, <i>The CKMFitter-BES collaboration</i></p> <p>Rencontres de Moriond 2008, electroweak session, 1-8 March 2008, La Thuile, Italy, <i>CKMFitter 2008</i></p> <p>Kaon Workshop 2008, 12-14 June 2008, Anacapri, Italy, <i>Dispersive approach to isospin breaking in $\pi\pi$ scattering</i></p>
T.N. Pham	8	<p>Joint Meeting Heidelberg-Liege-Paris-Wroclaw: Three Days of Strong Interactions and Astrophysics (HLPW08), Spa, Liege, Belgium, 6-8 March 2008, Liège, Belgium, <i>Two-photon decay of pseudoscalar quarkonia</i></p> <p>QCD 2008, 7-12 July 2008, Montpellier, France, <i>$B \rightarrow K\eta, K\eta'$ decays</i></p>

B. Moussalam	8	Kaon Workshop 2008, 12-14 June 2008, Anacapri, Italy, <i>Chiral expansions of the π^0 lifetime</i>
H. Sazdjian	8	Joint Meeting Heidelberg-Liege-Paris-Wroclaw: Three Days of Strong Interactions and Astrophysics (HLPW08), Spa, Liege, Belgium, 6-8 March 2008, Liège, Belgium, <i>Integral equation for gauge invariant quark Green's function</i>
L. Lellouch	8	Lattice 08, XXVI International Symposium on lattice field theory, 14-19 July 2008, Jefferson Lab, Williamsburg, Virginia, USA. <i>Kaon physics review</i>
J. Charles	8	Second Workshop on Theory, Phenomenology and Experiment in Heavy Flavour Physics, 15-19 June 2008, Anacapri, Italy, <i>CKMfitter update and short status of New Physics in $B-\bar{B}$ mixing</i>
B. Haas	8	Rencontres de Moriond 2008, QCD and high-energy interactions, 8-15 March 2008, La Thuile, Italy, <i>Charmed meson decays at Lattice QCD</i>
B. Malaescu	8	Rencontres de Moriond 2008, QCD and high-energy interactions, 8-15 March 2008, La Thuile, Italy, <i>Improved α_s from τ decays</i> QCD 08, 14th International QCD conference, 7-12 July 2008, Montpellier, France, <i>Improved α_s from τ decays</i>
M. Zdrahal	8	Kaon Workshop 2008, 12-14 June 2008, Anacapri, Italy, <i>Dispersive approach to isospin breaking in $K \rightarrow 3\pi$</i>
Simone Bifani	9	PASCOS 08 2-6 June, 2008, Waterloo, Ontario, Canada, <i>Low energy QCD and ChPT tests at NA48/2</i>
Gilberto Colangelo	9	EuroFlavour 07, Flavianet annual meeting, 13-16 November 2007, Orsay, France <i>IAC member</i> Séminaire Transalpin, 10-15 February 2008, Lyon, France, <i>Introduction to chiral perturbation theory</i> PHI-PSI-08, 7-10 April 2007, Frascati, Italy <i>Chiral symmetry, $\pi\pi$ scattering and a_μ</i> Flavour as a Window to New Physics at the LHC, CERN, May 5, June 13 2008 <i>The MSSM with minimal flavour violations and its running</i> XXVI International Symposium on Lattice Field Theory July 14-19, 2008, Williamsburg, Virginia, USA <i>IAC member</i> Flavianet annual meeting, 22-26 September 2008, IPPP, Durham, UK <i>IAC member</i> Bound States and Resonances in Effective Field Theories, September 29 - October 3, 2008, ECT* Trento, Italy <i>$\pi\pi$ scattering</i>

Jürg Gasser	9	Compass-Workshop, 2-3 April 2008 Turin, Italy <i>Chiral Perturbation Theory at COMPASS</i>
Peter Hasenfratz	9	Workshop Perspectives and challenges for full QCD lattice calculations, 5-9 May 2008 Trento, Italy, <i>The Delta Regime of Goldstone Bosons</i>
Heinrich Leutwyler	9	Workshop on Scalar Mesons and Related Topics, 11-16 February 2008 Lisbon, Portugal <i>Model-independent determination of the sigma pole</i> QCD08, July 10, 2008 Montpellier, France <i>IAC member – Recent developments in the physics of the light quarks</i> Summer School on Flavor Physics, 13-25 July 2008, Benasque, Spain <i>Introduction to Chiral Perturbation Theory</i> Quark Confinement and the Hadron Spectrum, 1-6 September 2008 Mainz, Germany, <i>IAC member</i>
Ferenc Niedermayer	9	Workshop Perspectives and challenges for full QCD lattice calculations, 5-9 May 2008 Trento, Italy, <i>CD with the fixed point action in the epsilon regime</i>
Emilie Passemar	9	BEACH2008, 22-28 June 2008, Columbia, South Carolina <i>Activities within the Kaon Working Group of Flavianet</i>
Volker Pilipp	9	Workshop on Flavour Dynamics, 3-10 November 2007, Albufeira, Portugal, <i>Hard spectator interactions in $B \rightarrow \pi\pi$</i>
Christopher Smith	9	BEACH2008, 22-28 June 2008, Columbia, South Carolina <i>Flavianet Network Activities</i>
Helmut Neufeld	10	FLAVIANet Kaon Workshop, Anacapri, Italy, 12-14 June 2008, <i>The $K_{\ell 3}$ scalar form factors in the standard model</i>
Martin Zdráhal	10	FLAVIANet Kaon Workshop, Anacapri, Italy, 12-14 June 2008, <i>Dispersive approach to the cusp in $K \rightarrow 3\pi$</i>
Akaki Rusetsky	11	Seminar at LNF-INFN, 6 December 2007, Frascati, Italy <i>Theory of $\bar{K}p$ and $\bar{K}d$ atoms</i> Meson 2008: 10th International Workshop on Meson Production, Properties and Interaction, 6-10 June 2008 Krakow, Poland <i>Cusps in the kaon decays</i> Seminar at HISKP, University of Bonn, 7 July 2008, Bonn, Germany <i>Isospin breaking effects in K_{e4} decays</i>
Ulf-G. Meißner	11	International Conference on Hadron Physics TROIA'07, August 2007, Canakkale, Turkey <i>Hadronic atoms</i> I3 HadronPhysics2 Opening Meeting, September 2007, Frascati, Italy <i>QCDnet: Hadron physics with light and heavy quarks</i>

		<p>HadronTH'07 Workshop, September 2007, Barcelona, Spain <i>Quark mass dependence of baryons</i></p> <p>International Symposium on New Facet of Three Nucleon Force – 50 years of Fujita-Miyazawa Three Nucleon Force (FM50), October 2007, Tokyo, Japan <i>Three-nucleon forces from effective field theory: Why Fujita and Miyazawa were not just lucky</i></p> <p>International Symposium on New Facet of Three Nucleon Force – 50 years of Fujita-Miyazawa Three Nucleon Force (FM50), October 2007, Tokyo, Japan <i>Partial wave decomposition of 2π-1π exchange three-nucleon force in chiral effective field theory</i></p> <p>18th Indian Summer School (I3S06): Strangeness And Hypernuclei October 2006, Rez, Czech Republic <i>The hyperon nucleon interaction: Conventional versus effective field theory approach</i></p> <p>CEA-FZJ workshop on High Performance Computing February 2008, Jülich, Germany <i>Nuclear physics from simulations</i></p> <p>Workshop on Hadron Electromagnetic Form Factors, May 2008, ECT*, Trento, Italy <i>Nucleon form factors from dispersion theory</i></p> <p>410. WE-Heraeus Seminar “Ab-initio Nuclear Structure - Where do we stand?” July 2008, Bad Honnef, Germany <i>Nuclear lattice simulations</i></p>
Bastian Kubis	11	<p>HEP theory seminar at RWTH Aachen, 18 October 2007, Aachen, Germany <i>Isospin violation and strangeness in the nucleon</i></p> <p>Lecture at the European Graduate School Basel–Graz–Tübingen, 16 May 2008, Basel, Switzerland <i>Introduction to chiral perturbation theory with baryons</i></p> <p>Talk at the FlaviAnet Kaon Workshop 2008, 12-14 June 2008, Anacapri, Italy, <i>Radiative corrections in $K \rightarrow 3\pi$ decays</i></p> <p>Seminar at HISKP, University of Bonn, 16 June 2008, Bonn, Germany <i>Non-relativistic EFT for $K \rightarrow 3\pi$ decays</i></p> <p>Lectures at the School on Flavour Physics, 13-25 July 2008, Benasque, Spain <i>Baryon chiral perturbation theory</i></p>
Stefano Capitani	11	<p>XXV International Symposium on Lattice Field Theory (Lattice 2007), 30 Jul - 4 Aug 2007, Regensburg, Germany, <i>Chiral violations from one-loop domain wall fermions</i></p>

Andreas Jüttner	11	Workshop: Lattice QCD Meets Experiment, 10 - 11 Dec 2007, Fermilab, USA, <i>Kaon Physics</i>
Andreas Jüttner	11	DPG Frühjahrstagung 10 - 14 Mar 2008, Darmstadt, Germany, <i>Status of Kaon Physics</i>
Jochen Heitger	11	Annual Meeting of the European Flavour Physics Network FLAVIANet (EuroFlavour07), 14 - 16 Nov 2007, Orsay, France, <i>Quark mass dependence of the heavy-strange meson decay constant in quenched QCD</i> XXXIX Arbeitstreffen “Kernphysik” 2008, 21 - 28 Feb 2008, Schleching, Germany, <i>Heavy quark masses from lattice QCD</i> International Workshop on e^+e^- collisions from Φ to Ψ (PHIPSI08), 7 - 10 Apr 2008, INFN Frascati, Italy, <i>Heavy quark masses from lattice QCD</i> XXVIII General FANTOM Study Week “The Early Universe”, 13 - 16 May 2008, Münster, Germany, <i>Baryogenesis and the electroweak phase transition</i>
Patrick Fritzscht	11	ECT Workshop “Perspectives and challenges for full QCD lattice calculations”, 5 - 9 May 2008, Trento, Italy, <i>Non-perturbative matching of HQET and QCD with two massless dynamical quarks</i> XXVI International Symposium on Lattice Field Theory (Lattice 2008), 14 - 19 Jul 2008, Williamsburg, USA, <i>Non-perturbative quark mass dependence in the heavy-light sector of two-flavour QCD</i>
Federico Farchioni	11	XXXIX Arbeitstreffen “Kernphysik” 2008, 21 - 28 Feb 2008, Schleching, Germany, <i>Gittersimulationen der QCD mit Twisted-Mass-Quarks und chirale Störungstheorie</i> ECT Workshop “Perspectives and challenges for full QCD lattice calculations”, 5 - 9 May 2008, Trento, Italy
Stefan Schaefer	11	Perspectives and challenges for full QCD lattice calculations, 5 May - 9 May 2008, Trento, Italy, <i>Simulations with dynamical HYP link Wilson fermions</i>
Shinji Takeda	11	10 Meeting of SFB/TR9 Computational Particle Physics, 18 Feb - 19 Feb 2008, Karlsruhe, Germany, <i>Perturbative analysis of overlap fermions in the Schrödinger Functional</i>
Oliver Witzel	11	10 Meeting of SFB/TR9 Computational Particle Physics, 18 Feb - 19 Feb 2008, Karlsruhe, Germany, <i>Spectral studies for a non-Hermitian polynomial</i>
Rainer Sommer	11	Perspectives and challenges for full QCD lattice calculations, 5 May - 9 May 2008, Trento, Italy, <i>Towards heavy quark physics with two light dynamical quarks</i>

Georg von Hippel	11	Flavour Physics Theory Institute, 12 May - 30 May 2008, CERN, Geneva, Switzerland <i>Two related methods for dealing with heavy quarks on the lattice</i> Perspectives and challenges for full QCD lattice calculations, 5 May - 9 May 2008, Trento, Italy, <i>Experiences with the DD-HMC algorithm on large lattices</i>
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3.5 General Networking

During the reporting period the FLAVIA*net* nodes have pursued an active scientific exchange. Here we list the visits focusing on research; visits devoted to training are listed in the Training Report.

Name	from Node no.	to Node no.	dates
Patricia Ball	3	4	1 April-30 Sept 2008
Aiofe Bharucha	3	4	8-15 June, 2008
C. Thomas	3	8	9/4/08 - 11/4/08
Roman Zwicky	3	4 (Aachen)	16-20 Jun 2008
Johann Kühn	4	5 (Frascati)	7-10 Apr 2008
Ulrich Nierste	4	5 (Cagliari)	3-4 Apr 2008
André Hoang	4	5 (Florence)	Oct 1-5, 2007
André Hoang	4	10 (Vienna)	Oct 29, 2008
Maximilian Stahlhofen	4	8 (Orsay)	Nov 14-16, 2007
Cailin Farrell	4	8 (Orsay)	Nov 14-16, 2007
Christoph Reisser	4	3 (Durham)	Oct 10, 2007
Christoph Reisser	4	8 (Orsay)	Nov 14-16, 2007
P. Colangelo	5	8	7/10/07 - 18/10/7
	5	8	29/6/08 - 6/7/08
Fulvia De Fazio	5	4	November 2007 (1 week)
	5	8	February 2008 (1 week)
R. Frezzotti	5	11	12.7.-19.7.07
Marco Ciuchini	5	8	20-23/2/2008
Jernej Kamenik	5	8 (Orsay)	12-21 Dec 2008
	5	8 (Ljubljana)	29/2 -10/3 2008
	5	4 (Karlsruhe)	4-7 Jun 2008
Javier Virto	5	2	10/4-20/4 2008
	5	2	16/6-23/6 2008
Vittorio Lubicz	5	8	31/3-3/4 2008
Gino Isidori	5	3	Jan 2008 (1 week)
	5	9	June 2008 (1 week)
Federico Mescia	5	8	April 2008 (1 week)
Enrico Nardi	5	8	June 2008 (1 week)
Henryk Czyż	6	4	15/10/07-15/12/07

	6	4	15/01/08-15/02/08
	6	5	01/07/08-15/07/08
Janusz Gluza	6	11	15/06/08 - 21/06/08
Krzysztof Kajda	6	11	15/06/08 - 21/06/08
Konstantin A. Kanishev	6	9	21/01/08 - 02/02/08
Maria Krawczyk	6	9	01/10/07-31/10/07
	6	9	01/01/08-28/02/08
Agnieszka Wapienik	6	4	10/11/07 - 10/12/07
S. Wycech	6	7	24-1/10/2007
Jan Eeg	7	10 (Ljubljana)	26/2-13/3/2008
Mikko Sainio	7	9 (Berne)	27-28/2/2008
D. Bećirević	8	10	6/4/08 - 19/4/08
M. Brinet	8	11	5.12.-19.12.05
S. Descotes-Genon	8	5	11/6/08 - 15/6/08
B. Haas	8	5	1/6/08-28/6/08
B. Moussallam	8	5	11/6/08 - 14/6/08
N. Offen	8	4	14/9/07 - 23/9/07
	8	4	24/1/08 - 26/1/08
	8	4	18/2/08 - 22/2/08
	8	5	8/9/08 - 13/9/08
L. Oliver	8	2	16/4/08 - 19/4/08
O. Pene	8	11	11.10.-17.10.07
H. Sazdjian	8	5	February 08 (1 week)
Gilberto Colangelo	9	11 (Mainz)	25-26 June 2008
Jürg Gasser	9	11 (Bonn)	28.1.-11.2. 2008
			16.6. - 28. 6. 2008
			28.7.-1.8. 2008
Christoph Greub	9	11 (DESY-H)	16.-27.1.08
Andreas Kastner	10	5	12-16 May 2008
Paul Posch	10	5	12-16 May 2008
Martin Zdráhal	10	5	12-16 May 2008
Martin Zdráhal	10	8	6-9 July 2008
Gerhard Ecker	10	4	8-9 July 2008
Nejc Košnik	10	8	3-10 June 2008
B. Blossier	11	8	13.11.-16.11.07
B. Blossier	11	8	10.03.08
B. Blossier	11	8	01.04.-04.04.08
G. Herdoiza	11	5	12.12-14.12.07
G. Herdoiza	11	8	04.03-07.03.08
G. Herdoiza	11	5	18.06-23.06.08

Collaborations among the different nodes have resulted in several joint publications. We present

the list of our common publications in the form of a matrix in Tab. 6 in order to display the networking aspect.

3.6 Changes to the schedule

The duration of the 2008 European Flavour Physics School (July 13 – July 25 in Benasque, Spain) has been extended to 12 days; this has allowed to schedule a broader set of lectures covering all aspects of flavour physics and effective field theories. We hired several ER and ESR on positions which were originally scheduled to be filled in the first year. The total number of filled positions now complies with the original hiring plan.

4 Economic spin-off

The experimental CDF group in node 4 has developed neural-network software for the original purpose to identify signal events over a large number of background processes in collider experiments. For example, their neural-network method was used in the measurement of the $B_s - \bar{B}_s$ oscillations at CDF and is currently used to analyse BELLE data. As a spin-off the company *<phi-t>*, which applies neural-network technology to data mining, was founded in October 2002. The company frequently hires former PhD students who worked in the B physics group of the CDF experiment. For more information see <http://www.phi-t.de>.

Researchers in node 8 (CNRS) have taken part in the development of parallel computers dedicated to lattice computations, both at the hardware and software levels. They have collaborated with other researchers in the Flavianet network from Germany and Italy, but also with IRISA/INRIA (National Institute in Computer Sciences, Rennes, France). Some of their joint work on parallel computation has been exploited by two small enterprises. An IRISA/INRIA start-up, CAPS-Entreprise, has developed and extended softwares linked to parallel processing and to on-board processors for large-scale computations. Another enterprise, KERLABS, has exploited their expertise to develop a Linux-based operating system for computer clusters.

The theoretical work at the FLAVIANet nodes involves advanced computing methods. The computing skills of our PhD students makes them attractive for private enterprises. We illustrate the variety of employment opportunities with two examples from node 7: Niclas Danielsson (PhD in Lund) works for *Ericsson* developing physical simulations and Axel Hiorth (PhD in Oslo) applies his computing expertise to reservoir modeling for the oil industry in Stavanger.

5 Conclusions

FLAVIANet members have written roughly 300 papers for refereed journals during the reporting period. We estimate that the FLAVIANet activity corresponds to at least 2/3 of the scientific output in theoretical flavour physics in Europe. Experimentalists in FLAVIANet were involved in numerous analyses of data from BaBar, BELLE, KLOE and the CERN experiments. The visibility of FLAVIANet research at international conferences is evident from the talks listed in Sect. 3.4. Our

annual network meetings, *Euro-Flavour 07* and *Euro-Flavour 08* were central events of our field of research in Europe. These meetings were complemented by other workshops and conferences organised by FLAVIANet members at their home institutions as described in Sect. 3.4.

During the *Euro-Flavour 08* conference we passed the Mid-term Review. In response to recommendations of our reviewer, EU consultant Prof. Fabrizio Fontana, we have added two elements to this document compared to previous reports: We have added a piece of information to Tab. 6 and included Sect. 4 on the economic impact of FLAVIANet.

FLAVIANet continues to foster transnational scientific cooperations, which resulted in common publications of different nodes (see Tab. 6). FLAVIANet brings people and their expertises together and actively contributes to a structured European science landscape.

	1	2	3	4	5	6	7	8	9	10	11
1	29	[16, 20, 34, 43]	[71]	[4, 13, 27, 118–122]	[8, 9, 12, 63, 139–141]	[197]		[8, 12, 262]	[8, 12, 19, 21]		[8, 10, 12, 17, 19]
2	[16, 20, 34, 43]	19		[16, 52, 63, 118–122, 127, 133]	[63]	[197]		[31]			
3	[71]		20	[4, 63]	[63, 179–183]	[197]		[234, 235]			[65, 68, 86–88]
4	[4, 13, 27, 118–122]	[16, 52, 63, 118–122, 127, 133]	[4, 63]	38	[4, 63, 118–125, 130, 133, 149, 176–178]	[4, 63, 199, 200]		[4, 63, 104, 118–122, 133]	[4, 63, 133]		[4, 98, 121, 122, 133]
5	[8, 9, 12, 63, 139–141]	[63]	[63, 179–183]	[4, 63, 118–125, 130, 133, 149, 176–178]	26	[196, 197, 201]	[150]	[8, 12, 63, 145, 148, 150, 179–183, 226, 231, 241, 262]	[63, 148, 173]	[167–170]	[8, 12, 139–141, 226, 261, 265]
6	[197]	[197]	[197]	[4, 63, 199, 200]	[196, 197, 201]	8		[197]	[197, 203]		[184–189, 203]
7					[150]		5	[150]	[150]	[167]	
8	[8, 12, 262]	[31]	[234, 235]	[4, 63, 104, 118–122, 133]	[8, 12, 63, 145, 148, 150, 179–183, 226, 231, 241, 262]	[197]	[150]	20	[8, 12, 145, 150, 216, 218, 226, 242–244, 262]	[170, 219, 230]	[8, 12, 150, 222, 223, 223, 236, 262, 279]
9	[8, 12, 19, 21]			[4, 63, 133]	[63, 148, 173]	[197, 203]	[150]	[8, 12, 145, 150, 216, 218, 226, 242–244, 262]	17		[10, 19, 85, 250, 257, 266–270, 295, 296]
10					[167–170]		[167]	[170, 219, 230]		4	
11	[8, 10, 12, 17, 19]		[65, 68, 86–88]	[4, 98, 121, 122, 133]	[8, 12, 139–141, 226, 261, 265]	[184–189, 203]		[8, 12, 150, 222, 223, 223, 236, 262, 279]	[10, 19, 85, 250, 257, 266–270, 295, 296]		33

Table 6: Joint publications of several nodes within the reporting period. Rows and columns correspond to the 11 nodes, the bibliographical items refer to the list of publications in Sect. 2. The diagonal elements (boxed boldface numbers) are the number of publications which the corresponding node wrote without participation of other nodes.