38^{th} MEETING OF THE LNF SCIENTIFIC COMMITTEE
FINDINGS AND RECOMMENDATIONS

PRELIMINARY MATTERS

Since the previous meeting the President of INFN reappointed for a second three-year term the following members of the Scientific Committee: T. Akesson, L. Fayard, J. Jowett, F. Linde, J. Zinn-Justin. The chair had been reappointed for a second three-year period earlier this year.
Two members of the Committee and two observers had communicated that they could not attend this meeting, due to several unrelated circumstances: T. Akesson, J. Zinn-Justin, A. Bracco and F. Ferroni.

The highlight of the 38^{th} meeting (May 11-12, 2009) was the achievement of lasing in SASE mode by SPARC. This is an important milestone and confirms the strong scientific standing of the LNF in the international arena.The main focus of the discussions was the program of DAΦNE for the second half of 2009, in view of the performance of the accelerator complex, the first results and the rate of data-taking of SIDDHARTA, and the preparations for the roll-in of KLOE. Recommendations to the LNF and the INFN management were formulated by the Scientific Committee and are recorded here.

The Committee also heard a comprehensive report on the recent KLOE-2 Physics Workshop, and a talk on the DAΦNE Synchrotron Light facility.

1. PHOTON SCIENCE

J. Rossbach met with the SPARX representative L. Palumbo and with the SPARC project leader M. Ferrario on 11 May 2009 and discussed a number of scientific, technical and management issues related to these projects. J. Jowett joined for part of the time. The findings are as follows:

1.1 SPARC

SPARC has achieved a major milestone in demonstrating lasing in the SASE mode. They achieved a power gain of more than 10^6 resulting in pulse energies of 1μJ, only about a factor of ten below the expected saturation level. The scientific committee congratulates the Lab and the SPARC group for this important achievement. With this success, LNF is now one of four labs in the world with a running SASE FEL: DESY, LNF, SLAC, and Spring8. It indicates that the team has all the knowledge and technology under control to successfully build and operate a high-gain FEL, in particular the SPARX project.

The further strategy of SPARC has three main elements:

1. Accumulate in-house competence on issues critical for SPARX.
2. Contribute to FEL science at a state-of-the-art level with a characteristic, stand-alone program.
3. Development of a high-brightness injector R&D program with in-house applications for FELs such as external injection into plasma acceleration and Compton backscattering.

Each of these program items is in the focus of international attention. They are all considered appropriate by the committee.

Thanks to the sub-ps short pulse length, the electron beam offers the possibility of generating powerful THz radiation without further investment. It is very positive that a scientific user group has been involved in this opportunity.

Operation of SPARC was interrupted during summer of 2008 for more than two months due to the lack of air conditioning in the power supply hall. Since no countermeasures have been taken so far, it is foreseen that this will happen again during summer 2009. The committee suggests once more installing air conditioning in the power supply hall. The estimated cost is about 300 kEUR. Should this not be done this year, the lab management should explain why the priority of this investment did not qualify it to go ahead.

Plans are reported to extend the SPARC tunnel in order to provide space for an energy upgrade of the linac and for some user operation making use of the SPARC FEL radiation. As already pointed out in December 2008, this is strongly supported by the committee, both in view of developing in-house competence on scientific applications and photon diagnostics, and in view of entering the UV wavelength regime which is attractive for users. Civil engineering drawings already exist, and a cost evaluation is under way. The committee invites the management to present a schedule for this upgrade at its next meeting.

The third accelerating section of SPARC does not perform very well. Two options for an upgrade are considered: Installation of an improved S-band structure which may allow the beam to reach 210 MeV or installation of a C-band (6 GHz) section which may lead to 230 MeV final beam energy. The major motivation for the C-band version is that SPARC would then represent a prototype for an attractive version of the SPARX injector. SPARC would also benefit from this energy upgrade, not only because of the additional 20 MeV, but because a final compression stage would gain from the linearization of phase space distribution, with benefits e.g. for the THz experiment.

The schedule for the FEL seeding experiment is delayed, but the sequence of priorities has not been changed:
a) Demonstration of lasing in SASE mode: This has been done, but saturation needs to be established. As was learned from initial SASE operation, this requires re-alignment of the undulators.
b) Seeding, expected now for autumn 2009, approximately.
This approach is considered appropriate.

Finally, the program for timing and synchronization at the femtosecond level was discussed. It includes running the FEL in single-spike mode, installation of a transverse mode cavity and, in collaboration with UCLA, operation of a FROG system, to be installed during summer '09. The committee observes that what is missing in this context is R&D on synchronization issues which will be indispensable for future pump-probe experiments.

It is suggested that a dedicated presentation will be given during the next committee meeting on generation, control and diagnostics of electron and photon beams at the femtosecond level.

1.2 SPARX

In view of budget and site limitations, options are under discussion on staging the SPARX project and/or reducing scope or size. As long as the boundary conditions are not clear and the potential options are not worked out in any detail, it is very difficult for the committee to provide scientific advice beyond the baseline design which has been presented in the Technical Design Report.

The committee already pointed out that the decision to build SPARX in the vicinity, and with major involvement of LNF, will require substantial priority decisions to be made in terms of manpower distribution within LNF.

Finally, the committee repeats its recommendation to not move SPARC hardware to SPARX once SPARX is being installed. Keeping the SPARC installation active on the LNF site will enable LNF to continue the rich SPARC program in parallel to installation, commissioning and operation of SPARX. In this way it will be possible to continuously improve the injector performance at SPARX, to study seeding issues, to develop in-house FEL user expertise, and to run a program that is complementary to SPARX (FLAME, etc.).

1.3 SYNCHROTRON RADIATION AT DAΦNE

As shown by A. Balerna in her talk in the open session, the synchrotron radiation program at DAΦNE received 15 dedicated beamtime days in 2008, more than ever before. "Dedicated time" means here that the user may determine to some extent the refilling time, but the storage ring keeps on running in collider mode with reduced luminosity. It is said that this mode of operation provides the best conditions for users, including stability. Nevertheless it might be useful to study to which extent the scope of user operation could be extended by modest modifications (e.g. enabling a different number of bunches or by giving up collider mode). Special attention in such a study would have to be given to any potential danger for collider operation.

The user time was distributed to Italian and international groups conducting a wide range of scientific experiments. The wavelength range spans from infrared to soft X-ray and thus reflects nicely the future wavelength range of SPARX.

As there is no open calls for proposals, the percentage of approved vs. requested time for experiments is not known.

There is no user support group, which makes the facility less attractive to external users. In view of SPARX it would be useful to start building up such a group because significant experience would be needed for it to operate effectively.

2. DAΦNE AND ITS PHYSICS PROGRAM

2.1 DAΦNE OPERATION

J.M. Jowett met with several members of the Accelerator Division to discuss DAΦNE operations since the last meeting, performance limitations and prospects and options for the coming months. The findings are as follows.

The Committee congratulates the DAΦNE team on the further improvements that occurred following the breakthrough in performance reported at the last meeting. In the succeeding weeks, several new records for peak ($L = 4.36\times10^{32}$ $cm^{-2}s^{-1}$**)** and daily integrated ($15\ pb^{-1}$) luminosity were established. Most importantly, an integrated luminosity of 1.03 pb^{-1}/h was demonstrated during one two hour period on 16 December 2008. This bodes well for the future KLOE run although it cannot be fully exploited for SIDDHARTA (see below).

The Committee notes that the DAΦNE staff have documented the progress with the large-Piwinski-angle plus crab-waist scheme in various places (unrefereed accelerator conference papers, ICFA Beam Dynamics Newsletter, etc.). They appear now to be close to having sufficient data for the refereed “Letter” type of paper that this important development deserves. We encourage them to publish one as soon as possible.

Following the resumption of the SIDDHARTA run in January 2009, machine operation has been devoted to accumulating data with less time spent on modifications and improvements.

Nevertheless, after the excellent start, the luminosity history in April 2009 was no longer typical of a collider that has recently undergone a successful luminosity upgrade. While the peak luminosity is still 3-3.5 10^{32} $cm^{-2}s^{-1}$ when running steadily, the integrated luminosity has been suffering from rather frequent interruptions. After downtime, some recovery time is often needed to restore performance.

It appears that the downtime is partly due to interventions on the SIDDHARTA experiment but also to faults in the collider or its injectors. Unfortunately, summary data to objectively quantify the share of various causes was not available. (However it is clear that the small fraction of time in which DAΦNE synchrotron light users are given priority has little effect on integrated luminosity.) The Committee recommends that the operations crews be given the routine task of logging this information on every shift. At a minimum, summaries should be sent to the Director and the running experiment on a weekly basis and presented at each meeting of the Scientific Committee.

As was previously noted in connection with the desirability of implementing simultaneous electron and positron injection, SIDDHARTA cannot take data while beams are being injected. In present conditions of beam lifetime and injection rate, the usable integrated luminosity is less than 50% of that delivered by the collider. This is highly sensitive to the rate of injection of positrons: the longer it takes to inject them, the more the electron intensity decays before data-taking can start for a smaller fraction of the total time with a smaller initial effective luminosity.

The current stored in the accumulator ring and, consequently, the injection rate, have degraded recently because the need for maintenance of the linac is now pressing. A striking consequence of this is that the demonstration of high hourly integrated luminosity performed last December could not be repeated now.

<u>Performance limits and future potential</u>

At present, the main limitations on the performance of DAΦNE are the positron current, the short beam lifetimes and the injection rates.

The beam lifetimes are determined mainly by the combination of Touschek scattering and the dynamics of large-amplitude particles in the beams. The Committee notes that an excellent quantitative understanding of the phenomenon has been achieved by non-linear tracking simulations which show that the octupole field components in the wigglers reduce the lifetime by a factor 1.5.

One (spare) wiggler magnet has already been modified to eliminate this field component and could be installed in any forthcoming short shutdown. It will be possible to modify all the wigglers in the long shutdown to install KLOE-2. The Committee strongly endorses this important improvement. This will also allow the same increase of radiation damping for a smaller current in the wigglers—a potential economy—or faster damping for the same current. It would be worth checking by calculation or simulation whether the enhanced radiation damping could increase the beam lifetime or even the injection rate.

Empirical adjustments of the optics can also have an effect on lifetime, apparently through their effect on the dynamic aperture.

As previously noted, the fast horizontal instability of the positron beam is attributed to electron cloud effects. The forthcoming increase of the feedback system power and the installation of stripline clearing electrodes are expected to help increase intensity. The tune spread induced by the electron cloud forces also appears to contribute to the Touschek loss rate.

The DAΦNE team considers that the potential for improvement through further work to eliminate 50 Hz noise in the common bonding network and RF system is now exhausted.

The upgraded injection kickers for both beams are not working in their intended mode because of problems with the pulsers. However the present hybrid configuration seems quite satisfactory and is expected to be improved with further pulsers covered by manufacturers' warranties.

The crab sextupoles are still not excited to the optimum level predicted by simulations. However it was stated that increasing their strengths will require dedicated beam time in order to control backgrounds and this is not a priority for the moment.

The outlook for performance for KLOE-2 remains good. More frequent filling and higher average currents in themselves will be a return to the conditions of the earlier KLOE run and are not expected to over-stress the machine components.
The new interaction region hardware and optics designs appear sound and provide some simplifications with respect to coupling compensation compared to the old scheme.

Transition from SIDDHARTA to KLOE-2

The following considerations were found to bear on the recommendations issuing from the 38th SC meeting, and are recorded here.

(a) Maintenance of the Linac and other systems of the DAΦNE complex will be needed before the end of 2009 in order to sustain machine performance and to keep it from deteriorating. These activities will take 1-2 months.
(b) Continuing operation of DAΦNE in the present conditions is likely to yield no more than 120 pb^{-1}/month recorded by SIDDHARTA. There is a risk, particularly in the hot summer months, that this will degrade further for lack of maintenance.
(c) The Accelerator Division estimates that the installation of KLOE-2 will take 4-5 months, followed by about 1 month for re-commissioning and vacuum conditioning, before they could start to establish physics conditions. Other improvements mentioned above will be implemented at the same time.

(d) The maintenance operations and the KLOE-2 installation can be carried out in parallel, thereby gaining 1-2 months operating time and reducing the total time spent recovering from shutdowns.
(e) Funding for DAΦNE operations (mainly the electricity cost) will run out in July. In previous years, additional funds were provided to keep DAΦNE operating. The Committee strongly recommends that such additional funds be found and their availability communicated to the concerned parties in a timely manner. It would be anticlimactic to say the least to not reap the physics benefits of the successful upgrade of DAΦNE.

2.2 SIDDHARTA

SIDDHARTA finished the kaonic ^{4}He runs in early 2009. The collaboration obtained an important result that confirms a previous KEK measurement, namely that the level shift deduced from the 3d→2p level shift is consistent with zero.

First preliminary and promising SIDDHARTA results were presented for the kaonic hydrogen energy shift with an error of about 25 eV, already exceeding the accuracy of the DEAR results by a factor of about 1.5. Major improvements were made concerning shielding and calibration stability. Systematic errors are now expected to be under control within 2 eV. These new hydrogen results are based on 100 pb^{-1} taken from early March 2009 onwards.

Defining the data-taking efficiency as the ratio between the total integrated luminosity recorded by SIDDHARTA and the total delivered by DAΦNE, the collaboration reports values around 30%. These low values are a definite concern, particularly when comparing to values of about 50% efficiency recorded towards the end of 2008. A series of problems that occurred in April resulted in even lower efficiencies.
This poses a serious question about realizing the SIDDHARTA approved physics program. Assuming a scenario with 120 pb^{-1} per month available at the experiment, the kaonic hydrogen measurements should continue until July. Given the technical efforts invested into SIDDHARTA in order to make this a precision experiment at the few eV level, it is considered mandatory to make sure that the approved 400 pb^{-1} baseline can indeed be reached.

The importance of the first kaonic deuterium measurement as an integral part of the SIDDHARTA core physics program has been emphasized several times by this Committee. The need for 600 pb^{-1} with a deuterium target is reaffirmed. However, given the boundary conditions in the 2009 running schedule, an exploratory measurement using 200 pb^{-1} is proposed after the summer shutdown. This is an initial step in order to investigate whether a meaningful signal can already be achieved at that level, and then to decide how to proceed further.

Communication between SIDDHARTA and DAΦNE should be intensified in order to ensure that the SIDDHARTA data-logging rate is maximized. In particular, it should be clarified whether the beam coasting time is optimal, given the relatively long fraction of total time spent injecting electrons and positrons. In addition, the efficiency should be monitored more often, and this information should be provided to the DAΦNE team.

2.3 PREPARATIONS FOR THE KLOE-2 ROLL-IN

The two referees attending this meeting, G. D'Ambrosio and M. Cavalli-Sforza, discussed the preparations of KLOE to roll into the interaction region and their planned schedule.

The collaboration is planning to be ready to roll in as of early September 2009.

The Level 2 CPUs have been installed; they will allow a data rate of 25 kHz, to be compared to calculations (done on the basis of the successful simulations of the DAΦNE backgrounds) of 4-7 kHz at a luminosity of $5 \cdot 10^{32}/\mathrm{cm}^2\mathrm{s}$. The CPUs for offline processing allow a throughput of 50 pb^{-1}/day.
The detector hardware has been rechecked; the EM calorimeter and the Drift Chamber are in good working order.
Equipment for the new interaction region hardware is being built according to plans, under the responsibility of the Accelerator Division. The dipole doublets to be installed on each beam, to offset the transverse kick from the solenoid, have been ordered. The new beam pipe, with a 30 μm thick Be central section, is fully designed and will be ordered soon. The mechanical supports are designed; Lead shielding, 4-9 X_0 thick, will be installed at small angles, to cope with the calculated backgrounds.
The pacing item is the Be beam pipe; that must be received by early November 2009 in order to fit into this roll-in schedule.

The γγ taggers are expected to be ready for installation at roll-in time.
The design of the taggers is based on detailed simulations of scattered electron orbits. The HET (High Energy Taggers) are scintillator hodoscopes to detect electrons of roughly 450 MeV that exit the beam pipe after the bending magnets. The LET (Low Energy Taggers) are calorimeters, which will be realized with LYSO crystals, to be placed between the interaction point and the IP magnets. APD readout of these crystals has been tested, with good results, at the Beam Test Facility. The supplier of these crystals has not been chosen yet; the order will be made soon. Should crystal delivery be significantly delayed (e.g., by more that one month) the collaboration would roll in the detector without the taggers, and would install them at the first shutdown.

Turning to longer-term upgrades, the cylindrical GEM detector R&D is progressing well; it is expected to be completed by the end of 2009. Funding for the full GEM tracker will be asked for from CSN1 this coming fall. The new inner tracker could be ready by early 2011, however a new clean room to assemble the detector is needed for this plan to go forward.

The collaboration was asked to outline the consequences of a possible delay in the roll-in schedule. It was stated that a delay of two months would have no major effect but that postponing the roll-in further would seriously threaten the strength of the collaboration.

2.4 RECOMMENDATIONS FOR THE TRANSITION FROM SIDDHARTA TO KLOE-2

The Committee examined in some detail the implications and the possible outcomes of three scenarios:

I) Stop DAΦNE operations and SIDDHARTA data-taking in July or early August, and proceed with KLOE-2 roll-in as expeditiously as possible after the August vacation.

II) Extend DAΦNE and SIDDHARTA running until the end of October, then shut down and proceed to the KLOE-2 roll-in.

III) Stop the DAΦNE run as soon as possible, and perform the maintenance of the machine complex as needed to avert near-term deterioration of the performance. Then resume the SIDDHARTA run.

Scenario III was seriously considered because it would minimize the risk of a low luminosity yield over the year 2009, that would benefit neither experiment. However it would most probably not give the most efficient use of time, because the shutdowns for maintenance and to install KLOE-2 would have to take place serially. After discussion, this scenario was rejected because of the perceived risk of important time losses when restarting the accelerator complex after a significant shutdown.

On the other hand, SIDDHARTA can be realistically expected to collect about 300 pb^{-1} of additional data on kaonic hydrogen before the summer vacation. This would allow it to complete its program on

hydrogen. The possibility of an exploratory two-month run with a D target after August would be very interesting to SIDDHARTA's program without jeopardizing KLOE's future.
In this scenario, KLOE-2 would start running again in March 2010, and would have time to find good operating conditions and take useful data before summer.
In summary, this scenario should allow both experimenters and Laboratory to profit from the investments made in SIDDHARTA, at an acceptable loss of time for KLOE.

Based on these considerations, the Committee recommends to the LNF management to adopt scenario II, and to INFN management to spare no effort in procuring the funding to make this scenario possible. The amount of additional funding is not large in comparison to the enhancement of the SIDDHARTA physics returns and to the investments already made in this line of research.

In order to follow up on the situation, the Committee would like to ask :
- That at the end of May, June and July SIDDHARTA report to the referees and the chair of the Committee the total integrated luminosities delivered by DAΦNE, the data-logging efficiencies and any other information deemed relevant.
- That by the end of July KLOE report to the referees and the chair the status of preparations for roll-in.
These reports are meant to be informal, in order not to impose significant efforts on the collaborations.

2.5 KLOE ANALYSIS AND KLOE-2 PHYSICS WORKSHOP

Since the last meeting of the SC several new results have been published:
(a) Hadronic cross section: $\sigma(e^+e^- \to \pi^+\pi^-\gamma)$ has been measured with the radiative return method at small photon angle. These results agree with those from other experiments (CMD2/SND) and strengthen the 3.3 σ disagreement between the $(g\text{-}2)_\mu$ BNL experimental result and the SM prediction, obtained using the experimental $\sigma(e^+e^- \to \pi^+\pi^-\gamma)$.
(b) The analysis of $\eta \to \pi^+\pi^- e^+ e^-$: here the study of the di-lepton invariant mass spectrum allows to establish the vector form factor contribution.
(c) Spectroscopic studies in decays of the Φ: a better understanding of theoretical models is obtained.
(d) An upper limit for $K_S \to e^+e^-$ has been obtained with the full data sample.

Several interesting results are close to publication:
(d) Hadronic cross sections: analysis at large photon angle and off-peak results. These analyses, close to completion, are very promising in view of complementing the published small angle results and further improving the determination of the SM value of $(g\text{-}2)_\mu$: this research is crucial to positively establish that there is a departure from the SM.
(e) Considering the KLOE result on the ratio $BR(\Phi \to \eta'\gamma)/ BR(\Phi \to \eta\gamma)$ together with the known experimental widths $\Gamma(\eta', \eta) \to \gamma\gamma$ one can perform a fit to determine the η'-gluonium content. In fact a substantial gluonium component in the η' pseudoscalar meson is found.
(f) The Standard Model predicts a helicity-suppressed $\Gamma(K \to e\nu)$, while supersymmetry breaking allows an enhancement of the ratio $R_K = \Gamma(K \to e\nu)/\Gamma(K \to \mu\nu)$ for large values of $\tan\beta = \langle H_u \rangle / \langle H_d \rangle$. 8000 K_{e2} candidate events have been collected by KLOE in 2001-2005 runs, leading to a competitive limit for R_K and consequently to interesting exclusion plots in the m_{H^+} - $\tan\beta$ plane.
(g) Quantum Mechanics tests from Φ-decays in entangled K_S K_L provide a unique window on novel phenomena. These tests will be very accurate and considerably important at KLOE2 with a GEM detector. KLOE already published results with 1 fb^{-1} of data; now the collaboration is taking advantage of the whole data sample.
(h) Studies of several η decays are close to completion: in particular the study of the form factor in $\eta \to \pi^+\pi^-\gamma$ and $\eta \to e^+e^- e^+e^-$.

(i) Several new results are expected on kaon decays: improvements on the K_S lifetime, also in the K_L lifetime, from the analysis of 2004/5 data; further results on BR($K^{\pm} \rightarrow \pi^{+} \pi \pi^{\pm}$) and BR($K_S \rightarrow \pi^{-} e \nu$).
(j) Also a preliminary analysis in the off-peak data for the reaction $\gamma\gamma \rightarrow \pi^0\pi^0$ has been presented in conferences. Here KLOE looks for possible evidence of a σ resonance. Evidence for this particle is shown after an accurate subtraction of the background.

Turning to future KLOE physics, there was a very clear and complete report by Caterina Bloise on the KLOE2 Physics Workshop that took place in April**;** 60 theorists and experimentalists participated with interesting new ideas, such as DM searches at low energies and an aggressive program for off-peak physics.
The workshop themes can be viewed as belonging to two categories: (i) Φ physics (K, ηdecays...); and (ii) off-peak issues. Regarding the latter, one must stress the importance of improving the theoretical determination of $(g\text{-}2)_{\mu}$ and comparing it to the direct measurement, which will improve in the future. Crucial for this purpose is improving the measurement of the hadronic cross section, $\sigma(e^+e^- \rightarrow \text{hadrons})$. in particular in the relevant region of $\sqrt{s}$ = 1-2 GeV. which can be explored by an upgraded DAΦNE much better than at any other planned machine. This measurement is the most attractive in the program of off-peak research at DAΦNE.

Of course, physics channels already measured in KLOE will be studied in greater depth: these include
- the already-mentioned off-peak cross section $\sigma(\gamma\gamma \rightarrow \pi^0 \pi^0)$, to be measured with γγ-taggers, looking for further evidence of the σ resonance.
- Kaon decays; $K_S \rightarrow 3\pi$ can be nicely measured.
- channels aiming to improve the determination of V_{us}.
- η physics.
- unique tests of quantum mechanics, by measuring the entanglement of K_S and K_L produced in Φ decays. Here the higher precision in measuring decay vertices given by the new GEM detector will significantly enhance the sensitivity of the measurements.

Another interesting possibility connected to the recent PAMELA findings is a possible secluded gauge sector (“U”) with a rich phenomenology at low energies, to be investigated by searching for the process $e^+e^- \rightarrow \gamma U \rightarrow \gamma + 2$ leptons).

The Committee strongly encourages the KLOE collaboration to continue pursuing all possible physics subjects that can be studied with KLOE-2.

2.6 AMADEUS

The referees (L. Fayard and F. Linde) met once with representatives from AMADEUS to discuss the status of the KLOE drift chamber data analysis, detector R&D and planning for AMADEUS-1 and AMADEUS-2.

AMADEUS offers the unique possibility of studying in detail the formation and the decay of deeply bound kaonic nuclear clusters (DBKNs) in kaon-nucleus interactions, provided DBKNs exist. This will either settle the DBKN controversy or open up an interesting physics domain.

In addition AMADEUS plans to measure low-energy (<100 MeV) K-p, K-d, K-^{3}He, K-^{4}He cross sections as well as decay properties of Λ- and (charged) Σ-baryons. Accurate cross sections in this energy region are currently not available.
The AMADEUS team is involved in two very distinct activities: (1) KLOE drift chamber data analysis; (2) AMADEUS detector R&D.

<u>KLOE drift chamber data analysis:</u>
In the plenary presentation no update on KLOE data analysis was presented, because the main player, O. Vásquez Doce, had to give priority to the ongoing SIDDHARTA run. In the discussion the following points were touched upon:

- The complete KLOE data sample of nearly 2 fb^{-1} is now available.
- The determination of the systematic error on the Λ-mass measurement is more complicated than anticipated. This will delay the publication of this very nice result.
- The referees urge the collaboration to publish the Λ-p and Λ-d (and possibly even Λ-t) invariant mass distributions and spectra because they are of high-quality compared to what has thus far been published by other collaborations.

As a general recommendation the referees urge the collaboration to work towards publications. By the next Committee meeting the referees expect a status report on the KLOE drift chamber data analysis.

<u>Progress on AMADEUS detector R&D:</u>
With the approval of several EU funding proposals (LEANNIS, JointGEM and a pixel photo-diode proposal), the collaboration is well positioned to pursue its detector R&D goals. Furthermore the KLOE-AMADEUS collaboration agreement signed in February 2009 is an important step towards the realization of the AMADEUS concept. Also the joint presentation of AMADEUS by KLOE and AMADEUS proponents in front of INFN's CSN3 in April 2009 was well received. AMADEUS is expected to submit its funding request to INFN in July 2009 and is expected to know the result well before the next meeting of the Scientific Committee.

Regarding the detector R&D proper, the referees were happy to hear that the scintillating fibers with silicon PMT trigger system were tested on DAΦNE without interfering with SIDDHARTA data taking. As stated previously, the referees are convinced the collaboration has the in-house expertise to realize the target cell. The tracker technology decision (cylindrical GEMs or TPC with GEM readout) can be taken at a later stage, after prototypes by other collaborations AMADEUS members are involved in have been evaluated (e.g. FOPI at FAIR/GSI).

From the operational view, the referees are pleased that the change-over from KLOE to AMADEUS basically boils down to a replacement of the KLOE special beam pipe with the AMADEUS insert consisting of trigger - target cell – tracker. For this to be successful it is also important to note that AMADEUS members are already today involved in several KLOE sub-detector systems, such as DAQ, controls, trigger, tracker, calorimeter.

2.7 MATTERS NOT DISCUSSED IN THE OPEN SESSION: FINUDA

The FINUDA collaboration will be asked for a report at the open session of next SC meeting. The Committee is looking forward to a comprehensive paper on the results of the experiment. By the next meeting, a partial written report would be welcome.